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ORCHARD IRRIGATION
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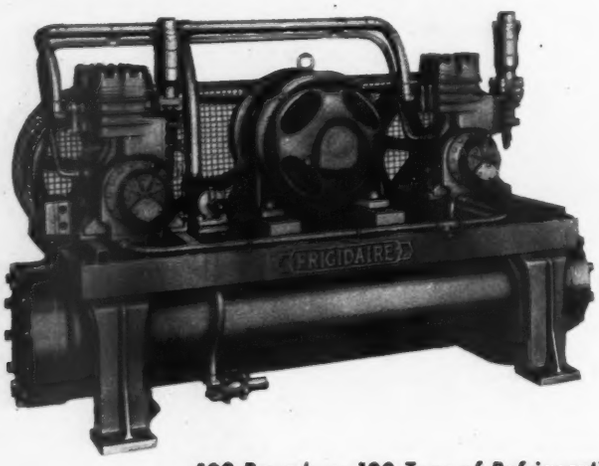

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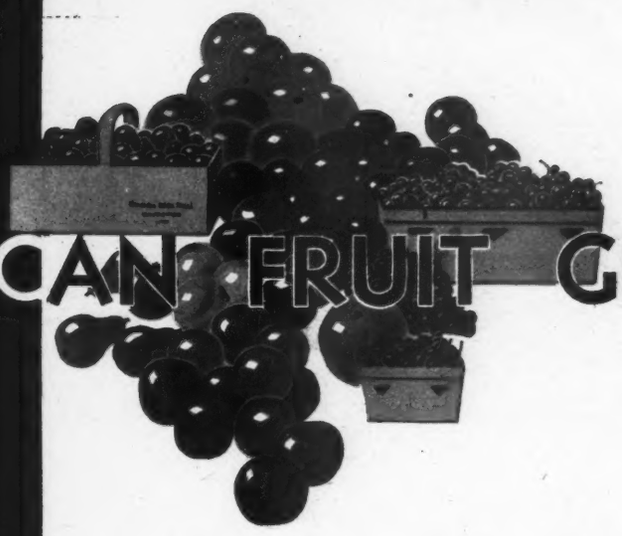

AMERICAN FRUIT GROWER

The
NATIONAL FRUIT MAGAZINE

CONTENTS

Orchard Irrigation in the Humid States 7
By H. W. Gerlach
Bunch Grape Tests in Georgia 8
Tree Growth of Peaches 8
Leaf-Blight of Pears 8
New Aspects of Fertilization 9
Orchard Drainage 10
By J. T. Olsen
Soil Erosion, the Enemy of the Orchard 11
By Clarence E. Baker
American Pomological Society 12
A Page Conducted in the Interests of the Society
Soil Management of Apple Orchards in the Brushy Mountains of North Carolina 13
By H. R. Niswonger
State News 14
Camera Closeups at State Meetings 20
Books for Fruitmen 27
Red and Black Raspberries—Varieties and Culture 28
By A. S. Colby
Nut Culture in Illinois 32
Annual Spring Checkup 36
New Time and Money Savers 37
By Handy Andy
Successful Orchards 38
A Round Table Page for Every Grower

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THE ORCHARD AND SOIL ACIDITY

SINCE one end of a tree grows in the soil, the orchardist ponders as to what he should do to maintain and improve it. This raises a many-sided question, and it is particularly pertinent at the opening of the season. Fertility, drainage, aeration, organic matter, acidity—all are in the picture and scientists seek the truth and attempt to interpret their findings. Let us focus our attention on the last of these for the moment, that of soil acidity, neutrality, and alkalinity.

In a recent drive through Pennsylvania we noticed white mounds of burnt limestone through the fields. This picture will bring back memories to many of our readers. It was early learned that lime would "sweeten" the soil and improve the growth of crops. As Dean Alfred Vivian of Ohio once wrote,

"Lime, manure, and vigorous clover
Makes the old farm rich all over."

Since most of the legumes and certain other crop plants are strikingly benefited by the use of lime, it raises the question about fruit trees. Do fruit trees thrive better on a limestone soil? Should they be limed occasionally to improve their growth, production, or the quality of the product?

These questions have been investigated from time to time, and, as frequently happens, some differences of opinion exist. But that fruit trees are tolerant of widely different soil reactions (pH—hydrogen ion concentration with pH 7.0 as neutral, and values below that acid and above alkaline) can scarcely be gainsaid. Recent reports from a wide range of locations indicate that fruit trees thrive at pH values of from 4.2 (Ohio, Washington, New York) to pH 8 (Washington, California) and even 8.5 (New Mexico). Surely no crop plant has a wider range than this.

It is true that sulphate of ammonia makes the soil more acid but after several years' use it had affected the acidity only to the depth of four inches (Ohio). Sodium nitrate had no measurable effect, and cyanamid reduced the acidity but slightly when applied at the normal rate (Missouri).

It is quite a different problem to consider the land area between the trees. There it is an agronomic problem of producing inter or cover crops to best advantage, and lime should be added as needed for those crops.

Boynton of Cornell University has reported that he has not been able to relate specific pH to productivity of fruit trees and that no lower limit has been definitely determined. Oskamp of New York and Batjer of the U.S. D.A. came to about the same conclusions. Where the pH value was high, in many cases the yield and tree growth were poor. But this they attributed to poor soil drainage and not to the pH value.

It is possible that varieties and kinds of fruit trees will vary in their response, but in general it may be concluded that soil drainage and character are of much greater significance than the acidity or alkalinity of the soil, in itself. The practice of applying lime beneath fruit trees for the purpose of "sweetening" the soil or to provide calcium as a nutrient would have application in very limited areas.

The Model O-12 on rubber—ideal equipment for road hauling and traveling between fields on hard-surfaced roads. The special citrus fenders can be obtained on special order.

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ORCHARD IRRIGATION IN THE HUMID STATES

The 10-acre irrigation pond on the Guy Beauman orchard at Tunnel Hill, Ill. Notice the pump house on the far side of the pond and also the luxuriant growth of the orchard. This picture was taken at the end of a three-weeks' drought.

By H. W. GERLACH
Agricultural Engineer

SUPPLEMENTAL irrigation to carry orchards through short periods of drought during crucial stages in the fruit development periods, is finding increasing use in eastern and middle western orchards. Average rainfall in these territories is generous but distribution is such that one to two and two to three weeks drought periods, particularly during times when fruits are filling, seriously affect the yield.

Far western orchardists rely almost entirely on irrigation and due to splendid systems and ample water supply they have accurate control over moisture to meet plant requirements. In sharp contrast to this system we find eastern growers have always been confronted with the spectre of drought periods in the land of abundant rainfall.

The University of Minnesota has released figures (Table I) showing the number of rainless periods of one to two and two to three weeks duration between April and October. Bear in mind when reading the table that these drought periods occur in decidedly humid states where rainfall averages over 30 inches per year.

Careful analysis of this table shows that the drought periods are of sufficient duration to cause deleterious effects not only on the fruit yield but also on root growth of the trees. The value of irrigation during the periods given in the table could not be measured entirely by increased yields. We must in addition take into consideration the beneficial effects upon quality and also upon the prolonging or hastening of the harvest periods in order to meet better market conditions.

Rare, indeed, is the orchard that does not have available either ponds, lakes, streams, or water-bearing strata below the ground that can be used to furnish water for irrigation. A recent census shows that irrigation in humid states has progressed tremendously (Table II).

Damming of dry run gullies having drainage areas of from 20 to 100 acres often proves to be one of the cheapest means of storing water. By choosing watersheds that have gradual slopes to prevent rapid run-off with resulting excessive erosion, the orchardist is often able to construct a farm pond that will have storage capacity ample to carry his orchard through ordinary periods of drought.

A splendid example of what can be done in this line can be seen on the Guy Beauman Orchard which is located at Tunnel Hill, Ill. The orchard consists of between 400 and 500 acres, almost equally divided between apples and peaches. It was found that the fruit yield in this orchard was often seriously affected by drought that occurred consistently during the latter part of May and the first part of June.

With almost the entire apple crop composed of early varieties, such as Transparent and Duchess, whose picking dates usually terminate about June 20, a loss in yield from 20 to 50 per cent was suffered due to lack of rainfall. With the rainfall average for the territory of from 36 to 42 inches per year, it is easy to see that it might be felt that irrigation would be totally unnecessary.

In 1935 construction of a sizable reservoir was started on this farm. By 1936 the dam was completed and approximately 10 acres of a large gully on the farm had been converted into a lake. The first part of the dam was constructed with horses and a light tractor and small scrapers. Fol-

(Continued on page 22)

GRAPES •

GEORGIA BUNCH TESTS

Through a series of tests over a five-year period, workers at the Georgia Mountain Experiment Station in the heart of the Blue Ridge Mountains have found that this section is well adapted to bunch grape culture. J. E. Bailey, in a report of the work, states that grapes will grow on a variety of soils ranging from sandy loam to heavy clay.

A fertile, gently sloping hillside, he has found, gives the best results for grapes in north Georgia. A porous subsoil is also important. Hillsides that are too rocky and steep for general farming may be useful as vineyard sites if soil is loose and of sufficient depth for proper root penetration. The latter type of soil must be well-fertilized and some form of humus must be supplied.

Contradicting a popular belief, the tests brought out the fact that soils of extremely high fertility are not always good for grapes. On this point Bailey says, "Grapes planted on the fertile creek and river bottom lands make too much vine growth and the fruit is likely to be of poor quality."

Black varieties used in the tests and which show promise are Concord, Fredonia, Worden, Moore's Early, and Champion. Red varieties are Brilliant, Caco, Catawba, Lucille, Lutie, Delaware, and Champagne. Niagara, Portland, Ontario, and Golden Muscat are the promising white varieties.

Bailey urges that in grape planting only No. 1 plants either one year or two years of age be used and these should be secured from reliable nurserymen.

An 8-4-6 fertilizer applied at the rate of 600 to 800 pounds per acre gave best results on sloping land, with shallow cultivation for weeds.

Success in the establishment of peach orchards lies in good growth of the young trees. Trees shown above indicate good growth and branch formation during initial period of development, resulting in strong heads and well-distributed branches.

PEACHES •

TREE GROWTH

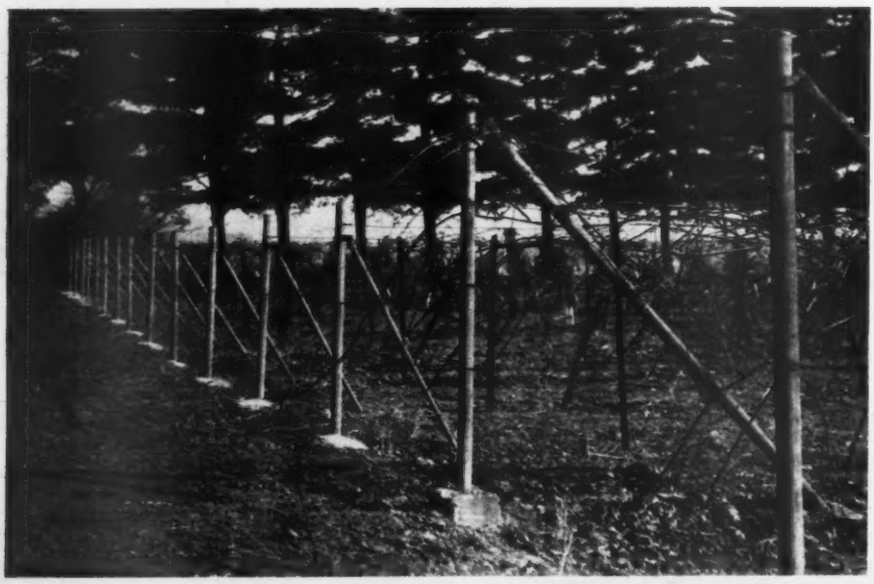
While speaking before the Virginia Horticultural Society meeting, M. A. Blake of the New Jersey Experiment Station said, "Peach trees which make a poor growth at the beginning form poor heads and are more seriously affected by root gall, borers, and Oriental peach moth."

In answer to a question as to what constitutes a poor and a good growth of peach trees after a season in the orchard, Blake replied: "Trees which possess not more than 25 branches of all lengths of which only one to three are 24 or more inches in length have made a very poor growth. It will require an extra year in many cases to bring such orchards into good bearing. If the nursery trees were well-grown, handled, and planted with the subsequent growth still bad, it means that the soil was poor, the tillage was not well done, or both."

Blake continued by saying that when one-year-old peach trees make a fair to good growth, they will have a spread of from three to four feet and possess 40 to 55 twigs of all lengths, of which six to 10 will be 24 or more inches in length. Peace trees, he added, will sometimes make more than double this amount of growth in a year.

In his talk, Blake pointed out that when heavy applications of nitrate of soda, as, for example, 300 or more pounds to the acre, are required to secure fair growth upon peach trees, it is very likely to mean that the soil solution is out of balance and that money is wasted when only one nutrient is applied. Where the subsoil is well drained but retentive of moisture, as in the case of some clay loam soils, the trees should develop to an extra large size if the surface soil is fertile.

Most popular of grape training supports is the two-wire trellis. In the photograph below, rigid steel end-posts, set in concrete and braced to provide wire tension, hold trellis wires in place, eliminating the necessity of costly annual repairs.



PEARS •

LEAF-BLIGHT

Although more commonly found in nurseries, pear leaf-blight may cause severe injury to bearing pear trees. The disease appears on pear leaves in the spring, first showing small, circular, red spots on the upper sides of the leaves which later turn dark brown and have a minute black spot in the center. When the spots are numerous, the entire leaf may shrivel, turn yellow, and fall from the tree.

The fruit also shows these spots and the skin is roughened. Growth

(Continued on page 18)

It has been found that for spring applications in orchards the minimum loss of readily available nitrogen fertilizers will occur if application is delayed until near the full bloom period.

NEW ASPECTS OF FERTILIZATION

Presented here is a brief digest of a talk given by U.S.D.A. Pomologist, Dr. J. R. Magness, before the 42nd annual meeting of the Virginia State Horticultural Society. A complete report of the talk appears in the proceedings issue of Virginia Fruit, which is the monthly publication of the society.—EDITOR.

IT is desirable to consider the fertilizer needs of the tree as distinct from the fertilizer needs of the sod or cover crop. The tree, for example, requires heavy intake of nitrogen during the early growing season. Equally heavy applications of nitrogen on the sod or cover crop are not necessary to secure good growth.

We have few, if any, clear-cut cases where trees have responded directly to applications of phosphorus, yet it is well known that cover and sod crops, particularly legumes, are heavy phosphorus users. Similarly, most of the orchard trees have not shown response to potash applications. We are much more likely to have favorable response to potash also in the more shallow-rooted crops.

Therefore, the problem of fertilizing the tree is distinct and different from the problem of fertilizing the sod or cover crop that may be growing in the orchard.

As nearly as we are able to estimate from chemical analyses, a well-developed 20-year-old apple tree requires the intake of from three-fourths pound to one pound of actual nitrogen per year to maintain it in a good growing condition and to produce a good crop of fruit. About one-fourth to one-third pound of nitrogen is required for the development of a heavy fruit crop, one-third to one-half pound for the development of a good vigorous foliage system in the tree, and probably about one-fourth pound for the new wood, bark, and root tissues which are laid down each year. This amount of nitrogen would be carried in about five pounds of nitrate of soda or in about four pounds of sulphate of ammonia or cyanamid. These are the amounts that actually should go into the tree.

Unfortunately, we have no method of application of nitrogen fertilizer where all that is applied to the soil is taken up by the tree. Appreciable amounts of the nitrogen that are applied to the soil may be lost by leaching. Additional quantities are taken up by the sod or cover crop, particularly if the fertilizer is applied in the area where these crops are growing.

It is difficult to get nitrogen to the tree roots through a heavy grass sod. The grass roots form such a dense mat in the upper soil layers that the nitrogen is all absorbed there unless applications are excessively heavy. Consequently, considerably more than four to five pounds of nitrogen fertilizer must be supplied to insure one pound of actual nitrogen being taken into the tree.

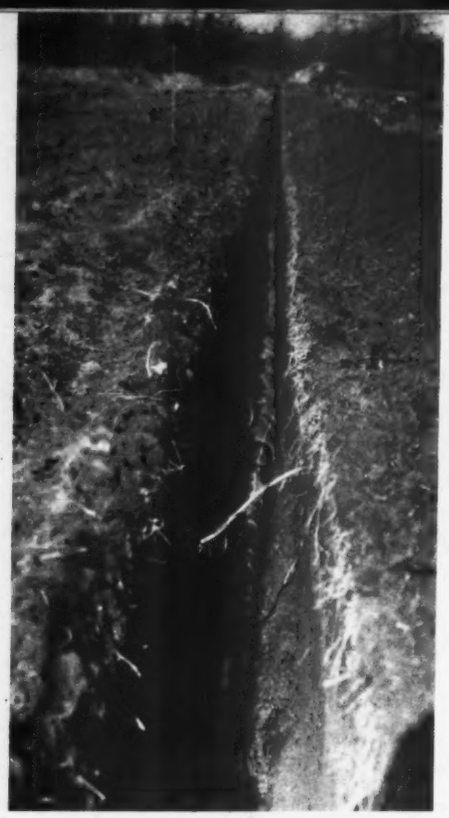
While some nitrogen will be taken into the roots whenever it is present in available form, investigations now under way at the U. S. Horticultural Station, Beltsville, Md., indicate that nitrogen is taken up most rapidly and most actively when there is a foliage system on the tree. This can be readily understood if we picture the conditions of moisture and nitrogen intake that apply at different seasons of the year.

If readily available forms of nitrogen are applied in winter after the leaf system has fallen, this nitrogen goes into solution in the soil water and a part of it comes into contact with the roots. So far as we now know, that part which comes into contact with the roots is taken up by them and stored in the roots over winter.

When foliage is on the tree, a stream of water is continually passing from the soil to the roots up through the tree and evaporating from the leaves. Soluble nitrates in

(Continued on page 16)

ORCHARD DRAINAGE



Since the success of an orchard enterprise may be dependent upon the adequacy of drainage in the soil root zone, it is important that the fruit grower give full consideration to this phase of soil management.

By J. T. OLSEN

Associate Drainage Engineer, Bureau of Agricultural Engineering, U. S. Department of Agriculture

EXPERIENCE has shown that orchards thrive best on soils that are fertile, deep, and properly drained. In selecting the location for an orchard, it is well to keep these essentials in mind, for the development of an orchard, from the planting of nursery stock to producing trees, represents a large investment of capital and labor.

It is possible to build up the fertility of the soil by application of fertilizers, the growing and plowing under of cover crops, or by other methods. Unless there is adequate drainage, however, sooner or later will occur the gradual sickening and death of the trees.

The wise farmer will use care and judgment in selecting the orchard site and if he has been successful in this respect and follows up with proper cultural methods and good management, his enterprise should turn out well.

Orchards set out and cultivated during favorable climatic seasons may make exceptionally rapid growth of both stock and root systems. In wet years, however, the resulting rise of the water table on inadequately drained orchard land will submerge the strong roots that were extended deep into the soil during favorable growing seasons to obtain needed moisture and plant food. This wet land will become cold and will lack the bacteria necessary to prepare soil elements for plant food.

If the soil is clay or silt loam and is allowed to remain saturated over long periods it will become compact and tight and offer greater resistance to the spreading of the small, hair-like rootlets. The first indications of "wet feet" generally are noticeable in the discontinuance of tree growth, fading of foliage, and the dying back of a few branches. Although the tree may continue to live and bear some inferior quality fruit for one or two more seasons, it will eventually die from suffocation of its roots.

If, on the other hand, the young orchard has matured during years of abundant, well-distributed rainfall and sufficient moisture has been available in the upper soil layers, the root systems will be spread out at shallow depths. Subsequent periods of insufficient rainfall will cause the groundwater to recede below the root zone and the development of trees and fruit will then be adversely affected.

A failing orchard that once was very productive may indicate an unsatisfactory drainage situation and only occasionally is rainfall distribution exactly suited to moisture requirements for a bumper crop. The proper control of the groundwater may determine whether or not an orchard produces profitable crops.

The installation of a complete drainage system is an expensive undertaking but when the orchardist considers that the success of his enterprise may be determined by the adequacy of drainage in the soil root zone, it is important that full consideration be given to this phase of soil management. The principles of orchard drainage are not unlike those of most farm crops except that in the orchard precautions need to be taken to prevent the tree roots from clogging the tile drains.

For those contemplating the establishment of a new orchard, there is ample opportunity to determine whether the soils are suitable and to plan drainage systems to control groundwater at optimum levels.

Good surface drainage is a first consideration. Before an orchard is started, it is advisable to grade the land so as to provide satisfactory run-off of excess water. Grading the land to permit the water to drain away from the trees to the center of the rows will greatly increase the effectiveness of drains, particularly on the heavier soils where seepage of water through the ground is slow. The cultivation and production of vigorous, deep-rooted leguminous crops, such as alfalfa, clover, or sweet clover, will loosen a compact soil and subsoil to permit better drainage and soil aeration, and give it a much improved condition for roots to develop and obtain plant food.

Although the greater percentage of roots by weight of such trees as the apple is usually found in about the upper two or three feet of soil, the presence of the small percentage of roots in the deeper sub-soils permits the tree to obtain some needed moisture during droughts. For this reason the fruit tree should be given the advantages of the maximum attainable volume of root zone by providing as large a block of soil as is possible for roots to enter and spread both laterally and in depth to secure the moisture essential to tree life and fruit development.

This requires that the fluctuations

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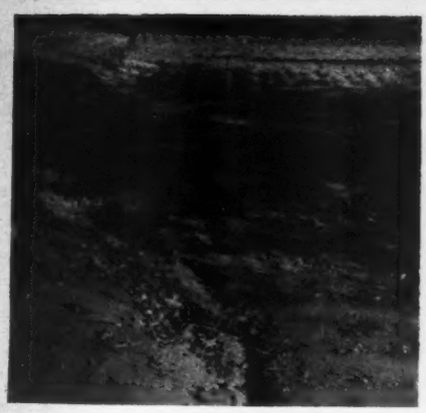

Left, top—A young apple orchard on rolling land. The main area is in sod but the young trees are well mulched with straw. Gullies are well protected. There is little chance for erosion here. Center—This may be the beginning of a large gully. Sod cover often is broken by portable spray outfits when the ground is soft, permitting water paths to form and wash away large amounts of soil. Bottom, left—This type of erosion often is found in cultivated orchards. Too frequently nothing is done to stop it until several inches of soil have been washed away. Right—What became of the soil beneath the pipe line? Sheet erosion stole that much soil in 10 years on almost level land. There was no noticeable loss of soil from the sod in the background.

SOIL EROSION

The Enemy of the Orchard

By CLARENCE E. BAKER

Purdue University Agricultural Experiment Station

THE last decade has witnessed a definite trend in the management of orchard soils toward less cultivation and greater use of sods and mulches. Among the leaders in this change of practice will be found many of the country's outstanding orchardists; the men who are securing crops nearly every year and are making a good income even in these days of low prices. These growers have learned their lesson either through experience or by observing the frequently disastrous results of constant cultivation over a long period of years.

The literature of past years has extolled the virtues of cultivation in glowing terms. We have been told how cultivation tends to make more plant food available, how it destroys weeds and grass, and how trees in cultivated soil grow and produce abundantly. These things are true but in many instances they are not the whole truth. The very virtues attributed to cultivation may soon become vices that destroy and wreck the enterprise.

Cultivation, by providing more favorable conditions for bacterial growth, leading to a more rapid decomposition of organic matter, may make plant food elements more rapidly available for tree growth, especially nitrogen. Continuing the process a few steps further, however, we find that there may also be an actual loss of nitrogen through leaching. In time, the constant oxidation of the soil organic matter leads to its ultimate destruction and the soil becomes so deficient in organic materials that it can no longer supply sufficient nitrogen for optimum tree growth.

The more fertile the soil at the beginning, the longer it will take to reach this unproductive state. This can be further postponed by growing cover crops to aid in maintaining the supply of organic matter. While this practice often is successful in the young orchard, it is very difficult to grow abundant cover crops in the mature bearing orchard and the net result generally is a loss of organic matter each season. Applications of inorganic nitrogen carriers cannot be depended upon to maintain growth and production on soils of low general fertility.

This loss of organic matter brings with it an undesirable change in the physical condition of the soil. Through the loss of organic matter or "humus," as we rather loosely refer to it, the soil tends to lose its granular structure or mellowness. It becomes more compact and runs together into an impervious mass when wet, checking the absorption of water. Soils well supplied with organic matter absorb a much larger amount of water and permit a more rapid movement to lower depths.

For this reason clay or loam soils low in organic matter generally are more subject to sheet erosion than similar soils with an abundant supply. The latter condition tends to encourage the absorption and penetration of rainfall, aiding water to enter the soil where much of it may be stored for use during dry periods. When rain falls on cultivated soils low in organic matter the result often is the puddling

(Continued on page 24)

APS

A PAGE CONDUCTED IN THE INTERESTS OF THE AMERICAN POMOLOGICAL SOCIETY

NAMING NEW FRUITS AND NUTS

DURING the past four years the Committee on the Code of Nomenclature of the American Pomological Society has done a notable piece of work in revising the old Code of Nomenclature of the APS. The committee has brought the code up-to-date to make it more nearly conform to modern pomological usage and to clarify certain procedures relative to the naming of bud sports which have been introduced during the past few years.

Nurseries, experiment station workers, the trade, and the general public all have a stake in naming new varieties. Anyone who is interested in naming a new variety should take great pains to study the Code of Nomenclature of the APS, and if this is done and the code is followed it will greatly assist in keeping variety names in conformity with what is recognized as good procedure.

The original code drawn by the APS was developed to clear up many problems which arose due to the fact that many varieties were being propagated under different names. This led to great confusion. During the past 20 years a large number of new varieties of fruits and nuts have been originated, named, and introduced. The activity along this line at the present time is widespread throughout the United States and Canada, and unusual care is needed to prevent the duplication of names and the renaming of varieties, and thus avoid confusion in the dissemination of new varieties.

While the Code of Nomenclature has appeared on this page during the past four years, because of the importance of this matter at this time it is felt desirable to present the revised 1937 code for the guidance of those who are interested in variety names for new fruits and nuts.

THE CODE OF NOMENCLATURE OF THE AMERICAN POMOLOGICAL SOCIETY

(Revision of 1937)

Purpose of the Code

This code aims to establish a simple system of pomological nomenclature that shall be appropriate, dignified, and stable. To this end it is urged that all persons conferring names upon new varieties of fruits endeavor to select simple and, preferably, one-word names that are fittingly expressive of some character, quality, place, person or event associated with the source, time or place of origin of the variety.

Scope of the Code

This code applies to all cultivated fruits and nuts.

Right to Name

1. The right of the originator, discoverer, or introducer of a new variety to name it, within the limitations of this code, is recognized.

Priority

2. The name first published for a variety shall be the accepted and recognized name except (a) when contrary to the provisions of this code, and (b) provided that names thoroughly established in American pomological literature shall not be displaced.

3. A name once published for a variety shall not be applied to another variety in the same group. The same name, once established through long usage for two or more American varieties, shall not be displaced for either or radically modified except when a suitable synonym can be used for one of the varieties. When no such synonym is available, the two varieties shall be distinguished by the addition of the name of the author who first described each, or some other suitable distinguishing term.

Form and Spelling of Names

4. Names of new varieties shall be of one word preferably but two words will be accepted. However, names of existing varieties, not in conformity with this rule, but which are well established by usage, shall not be changed in such a way as to lead to confusion or loss of identity.

5. The spelling and pronunciation of a variety name shall be the same as that of the person, place, substance or quality from which it is derived.

6. A possessive noun shall not be used.

7. A name shall not be formed by the compounding or hyphenating of two or more existing names, but this does not prohibit the formation of a one-word name from the parts of two or more existing names. Neither Bartlett-Seckel nor Bar-Seck may be used, but Barseck is admissible.

8. The hyphen shall not be used between the words of a name.

9. Initials or titles shall not be used as a part of a variety name—e.g., P. Barry (pear), Doctor Matthews (apple), or Governor Hogg (peach).

10. The use of such general terms as seedling, hybrid, beurre, damson, pippin or rare-ripe are not in harmony with this code and should be avoided.

11. An imported variety shall retain its foreign name, but it may be translated into its English equivalent, provided it does not conflict with the provisions of this code or with an existing American name in the same group.

12. The name of a person shall not be applied to a variety during his life without his consent.

Publication of Names

13. Publication consists in the distribution to the public of a name in printed form, accompanied by a recognizable description or illustration. A variety name may be established by current usage. A name so established shall be considered as published and shall have precedence over a later printed name for the same variety. Publication may be made in any book, bulletin, report, trade catalog or periodical which is distributed to the public.

Type of Variety

14. The type of a variety is the original plant. Type descriptions or illustrations shall be made from material produced by the original plant, if available and making normal growth, or from plants as near as possible to it in asexual reproduction, growing preferably in the same pomological region.

Description

15. The complete description of a variety shall consist of a detailed account of the characteristics of the plant, foliage, flowers, fruit, season, and habit of growth, so as to distinguish it from other varieties of similar appearance.

Naming "Bud Sports"

16. In naming the bud sports of recognized varieties, the names selected should, as far as possible, identify the new strain with the parent variety. One-word names formed by using parts of two or more existing names, or a single descriptive name either before or after the parent variety name will be recognized.

Recognizing Usage

17. Where there is a long-standing and well-established trend in the use of a name, which, according to the priority rule, is a synonym, the situation may be reviewed thoroughly by the Committee on Nomenclature and where justified action may be taken to recognize the name thus established.

Varieties Under Test

18. New or unnamed seedling selections while under test may be designated by number, letter, code term, or by other tentative means, without such designation being given the status of a varietal name. When a variety so held is later named, the name selected should be given priority over the tentative designations according to the priority rule of this code.

Renaming for Trade Purposes

19. Renaming a variety having an established name is declared unethical and contrary to the objective of this code in establishing a permanent system of nomenclature.

Committee on Nomenclature

Dr. M. B. Davis, Dominion Horticulturist, Central Experiment Station, Ottawa, Canada; G. L. Slate, Agricultural Experiment Station, Geneva, N.Y.; John Bregger, Division of Research, Soil Conservation Service, Williamsport, Pa.; Paul Stark, Louisiana, Mo.; and Dr. M. J. Dorsey, University of Illinois, Urbana, Ill., chairman.

Memberships

If you have not already remitted for dues in the APS for 1938, do not fail to do so. We cannot send you the annual report of the Springfield meeting unless dues have been paid for the fiscal year of 1938. The dues—$1.25—should be sent to the secretary, H. L. Lantz, Ames, Iowa.

H. L. Lantz
SECRETARY

Figure I—An example of serious soil erosion as a result of continuous cultivation without the use of cover crops. Many of the trees have died and others are in a weakened condition.

Figure II—Lespedeza, grasses, and clovers growing in four-year-old apple orchard of C. F. Brethol in Brushy Mountain section. Heavy growth of vegetation as early as May.

Figure III—Orchard grass is used as a permanent cover crop in this orchard. The shaded area under the trees shows where the orchard grass has been turned under by hand hoeing.

SOIL MANAGEMENT

of Apple Orchards in the Brushy Mountains of North Carolina

By H. R. NISWONGER

THE apple orchards of the Brushy Mountains of North Carolina have been set on sloping land and are most susceptible to soil erosion when clean cultivation without a cover crop being turned under is practiced. Previous to the era of sowing Lespedeza for a cover crop in the orchards as a factor in conserving the soil, many orchardists in this fruit growing area of the State practiced clean cultivation and depended on the fall growth of grasses and weeds for building up the organic matter in the soil. The fall growth of grasses and weeds was plowed under in early spring and in some instances no further use of soil implements was practiced. This kind of cultivation often left the land with open plow furrows through which the spring and summer rains found easy passage, carrying with them the fertile top soil to the creek and rivers of the lowlands. Figure I shows the result of continuous clean cultivation without the use of cover crops or lack of serious consideration of the problems of soil erosion.

About this time Lespedeza was being used in the lowlands by cotton and grain farmers as a soil-building agency and as a preventive for soil erosion. On the advice of the county agents in this fruit growing area a number of orchardists became interested in sowing Lespedeza as a cover crop in their orchards. At the present time a large per cent of the orchard acreage is planted to Lespedeza. There are a few acres in sweet clover or a combination of Lespedeza, sweet clover, and orchard grass. It was noted that the native grass and clovers began to appear in these orchards after Lespedeza had been left growing for one or more years. Figure II shows native grasses and clovers growing with Lespedeza in a four-year-old orchard as early as May. Figure III shows where orchard grass predominates.

There are several methods being used in handling this cover crop. A common practice is to use the Lespedeza as a permanent cover crop for two or three years which is mowed and cuttings left to remain over the orchard area as a mulch (Figure IV). Hand hoeing is practiced under the trees, keeping all growth of grasses

(Continued on page 26)

Figure IV—Cover crop of Lespedeza, grasses, and weeds used by Herman Deal in the Brushy Mountain area. Lespedeza has been growing in this orchard for the past three years. In 1937 the cover crop was disked under.

Figure V—Strip cultivation. Clean cultivation along tree row. Middles between tree rows sown to rye and Lespedeza. Rye cut for grain leaving Lespedeza as permanent cover crop.

Figure VI—Strip cultivation practiced in order to prevent soil erosion. Alternated middles in every other year are clean cultiyated. All growth is disked under until late summer.

STATE NEWS

CALIFORNIA—Stability of the fruit industry is attested by the fact that Lord & Thomas have been retained by the California Fruit Growers Exchange, Los Angeles, as advertising council ever since the exchange started advertising in 1908.

Just three decades ago the first orange and lemon advertising campaign of the exchange was run in the State of Iowa as a test. This was before the name "Sunkist" was adopted as a trade-mark. By the end of the season, sales in that State had increased 50 per cent while the remainder of the country showed a gain of only 17 per cent.

Since that first campaign, the exchange has invested $25,000,000 in advertising, representing 1.12 per cent of the delivered value of the fruit. The exchange crop of citrus in 1908 totaled 17,636 carloads. Today California growers in a representative crop year produce and ship over 100,000 cars of citrus. Per capita orange consumption during this time has increased from 31.4 to 79.

As W. B. Geissinger, advertising manager of the exchange, points out, "With the appearance of the first exchange ad a campaign of advertising was initiated which has had few parallels in merchandising history for consistent continuity and definite measured results."

MASSACHUSETTS—Pressing peaches into dollars is what John E. Rice of Marlborough, president of the Massachusetts Fruit Growers

Association and owner of one of the largest fruit farms in New England, does with a goodly portion of his crop. Rice gets two and a half gallons of juice from a bushel of peaches. To this juice he adds an equal part of water, five pounds of sugar, and a few drops of essence of almond. Returns are $1.25 a gallon or $6.25 for the five gallons of excellent peach juice and expenses total $1. Rice sells his peaches to himself at 80 cents a basket. Peach jam, which readily sells for 35 cents a jar at his roadside stand, he produces for 14 cents.

Surplus and off-grade apples Rice turns into pasteurized cider in his own canning plant. The cider sells readily for 45 cents a gallon without container and 25 cents a half gallon. He gets almost four gallons to a bushel of fruit, sells close to 6000 gallons a year, and nets $1.50 a bushel on 20-cent apples. Some of his pasteurized cider is made into apple jelly. Out of a five-gallon lot of cider, this by-products minded fruit grower gets 90 jars of jelly and takes in $14 gross. He can turn out 1700 jars a day with three workmen.

WASHINGTON—Approximately 5,000,000 boxes of apples are shipped annually to Europe and other parts of the world from the vast apple growing regions of Yakima and Wenatchee. The fact that these apples are carried on the high seas in foreign instead of American vessels was responsible for a special hearing in Seattle recently before the U. S. Maritime Commission. Prominent spokesmen of the apple growers at the sessions were Irvin L. Plette and F. O. Sweitzer of Yakima and A. M. Groseclose of Seattle.

Focal point of the proposed program was for establishment of an American merchant marine service to carry apples from the Pacific Northwest orchards to foreign ports. "In no other trade route is the need for American flag service so apparent as the re-

frigerator service to Europe," stated Col. W. C. Bickford, manager of the Port of Seattle. "It is essential that something be done toward establishing intercoastal refrigerated service."

MINNESOTA—In the greenhouses at the University of Minnesota Fruit Breeding Farm the Burbank plum trees were loaded with plums the size of robin's eggs about the middle of March, this fruit, of course, being cross-pollinated with hardier varieties. In this manner the fruit breeding program for 1938 is in full swing long before the snow disappears from the ground outdoors.

Crews of men were also busy in the field at this time taking out several thousand apple trees about 12 years old. These were cross-pollinated seedlings that had fruited and were being discarded. Only a very few trees out of many thousands are good enough to keep for further testing.—J. D. WINTER, Sec'y, Mound.

OHIO—Well fortified with information on insect and disease control are those growers who are taking advantage of the co-operation extended by the Ohio Agricultural Extension Service. The first of a series of timely fruit spray service letters compiled by the service has been mailed out. The extension service bulletin entitled, "Spraying Program and Pest Control for Fruit Crops," has been revised and is available to all growers. Spray service radio talks will begin about the time the apple buds start to emerge in April.

KENTUCKY—Graves County strawberries will be shipped from Mayfield, which has been established as the shipping center by the McCracken County Strawberry Growers Association, according to L. R. Wren of Kevil, president of the association.

Organized 25 years ago, the association now has 5000 members. Strawberries grown in eight counties of Kentucky and one in Illinois are shipped through the association.

CONNECTICUT—If its progress continues at the same rate as it has the past five years, the "X" disease will soon be a major pest of peaches in Connecticut orchards. E. M. Stoddard, pomologist at Connecticut Agricultural

Experiment Station, New Haven, warns growers to be on the lookout for the disease the coming season and report all cases to the station immediately so that investigations may be made.

The disease—called "X" because previous to its discovery in Connecticut orchards five years ago nothing was known about it—is characterized by premature yellowing and dropping of leaves on peach trees. Fruit will drop early or be worthless and eventually the tree may die.

Investigations carried on by the station indicate that the chokecherry is a carrier. If experiments now in progress produce the expected results, it is hoped that removal of chokecherries in the vicinity of peach orchards will definitely be the practical solution of the problem. In the meantime destruction of chokecherries near peaches is recommended as a wise precaution.

MARYLAND—Following the trend of smaller packages as well as the practice of growers in the South, strawberry growers on the Eastern Shore Peninsula will in 1938 pack their berries in a 24-quart crate instead of a 32-quart crate as heretofore.

The new crate has the advantage of encouraging a neater pack, it permits grading with less difficulty, and increases sales.

Since southern-grown berries have been packed not only in smaller crates but also in pints instead of quarts, growers say they have been realizing greater sales.

KANSAS—Let us never lose sight of the valuable assistance rendered by insect-eating birds. I was recently in a Kansas orchard where the downy woodpecker and its relatives did an excellent job of cleaning up the codling moth larvae found under the old

rough bark. This particular orchard was near a woodlot of wild timber. (Hawks and owls, too, are of inestimable value as their natural diet consists of mice, gophers, grasshoppers and other common pests.)

Codling moth carryover of worms for the State seems to be greater than usual. Many orchardists are scraping the rough bark, with a view to using chemically treated codling moth bands. Scaffold limbs should be banded as well as the trunk of large trees, but care should be taken not to use chemically treated bands on green or young growth.—GEO. W. KINKEAD, Sec'y, Topeka.

RHODE ISLAND—Three groups of fruit growers, representing their farm bureau districts, have just completed going over the long-time situation for fruit growing in Rhode Island. In order to satisfactorily use the latest equipment, commercial units, it is felt, should be increased to 30 acres. Acquainting the people of the State with the importance of the local industry is another task growers have to take care of. (In 1937 Rhode Island produced an estimated 345,000 bushels of apples at an estimated farm valuation of $431,250; 27,000 bushels of peaches valued at $40,500; 12,000 bushels of pears valued at $15,000; 370 tons of grapes valued at $22,200. —Ed.)—E. P. CHRISTOPHER, Sec'y, Kingston.

IDAHO—Due to running irrigation ditches up and down hill rather than on the contour, from five to seven inches of the rich top soil in some of the larger orchards has been moved down into the valleys. The extension soils specialist at the University of Idaho urges growers to seriously consider the erosion factor in orchard irrigation management.

(Continued on page 35)

BUD-MOTH INJURY. Photo Courtesy Conn. Agric. Exp. Sta. "Nicotine sulphate in the green-tip or delayed dormant spray is the important factor in bud-moth control."— *Cornell Bulletin 314.*

PROTECT that crop with "Black Leaf 40" now, guard it through the summer. Don't let insects, diseases or spray-injury shrink your crop and profits.

"BLACK LEAF 40"

controls aphis and bud moth, red-bug and leafhoppers

This effective and economical contact spray stops the damage from these costly insects. Add it to your early sprays. Its contact action fortifies arsenical codling moth sprays, killing mature eggs, young larvae and adult moths. Will not injure foliage. Cornell Bulletin No. 314 says:

"The control of bud moth depends on the thorough application, year after year, of the regular schedule of sprays recommended for the control of rosy aphis, scab, and codling moth."

"BLACK LEAF 155"

controls codling moth, summer aphis and leafhoppers

The modern insecticide—*durable, yet* leaves no harmful residues at harvest. "Black Leaf 155" has proven effective in controlling worms and stings, also summer aphis and leafhoppers. Its bland ingredients permit normal foliage development.

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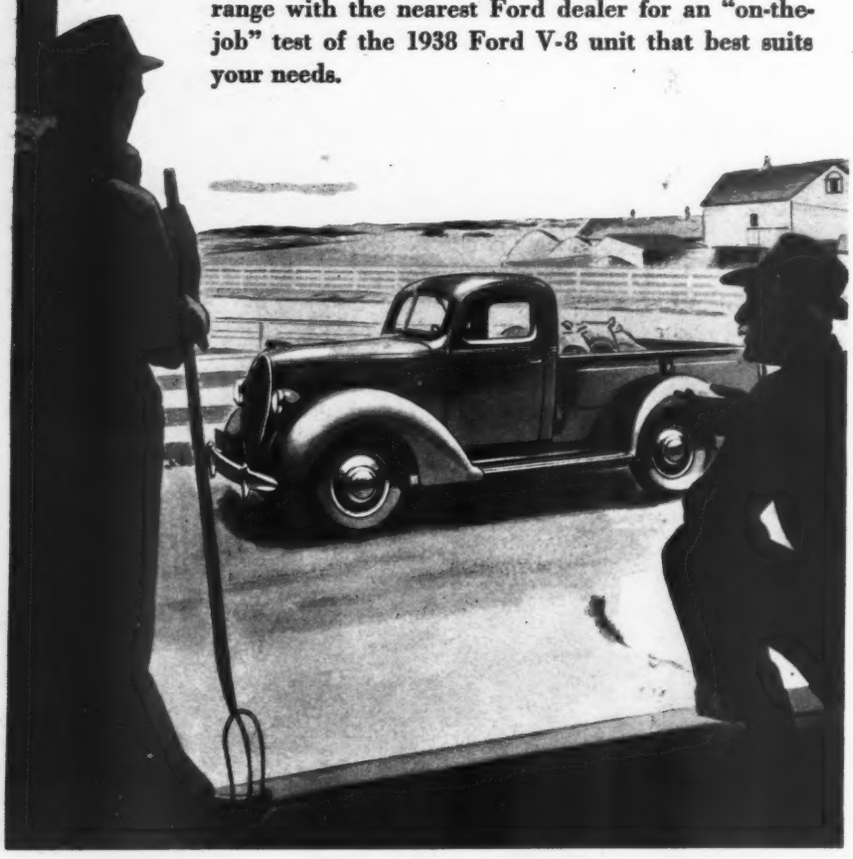
Many a farmer is pointing with pride at his 1938 Ford V-8 Truck and telling his neighbor what a wonderful worker it is. He likes the efficient, easy way his new Ford unit does its chores — the economy with which it works.

The 1938 Ford V-8 Trucks have many improvements and refinements which, combined with the time-proved Ford V-8 features, make them even more dependable and economical. Brakes are larger, quicker stopping. Steering is easier because of new worm and roller type steering gear and a new larger steering wheel. Cabs are roomier; cab seats are more comfortable. Even such details as front wheel spindles are larger and stronger.

In addition to the new 134-inch and 157-inch trucks and the new 112-inch units, there is also an entirely new line of 122-inch wheelbase one-ton trucks. Arrange with the nearest Ford dealer for an "on-the-job" test of the 1938 Ford V-8 unit that best suits your needs.



FORD V·8 TRUCKS

FERTILIZATION

(Continued from page 9)

solution in the soil water would be carried to the roots by this water movement.

During the growing season there is rarely sufficient precipitation in many sections so that water is actually moving from the surface two or three feet of soil down into lower soil areas. Plant growth is continually drying the soil during the growing season, and summer rainfall is usually not more than enough to replace this water drawn out by the trees and other plants. Consequently, during the summer there is relatively little loss of nitrogen from leaching.

In the spring of 1937, nitrate of soda was applied to experimental trees at Beltsville growing in a gravelly, clay loam soil on March 25 and again on April 15. Between April 15 and 30, approximately five inches of rain fell. Analyses for nitrates in the soil taken after this rain showed that much of the nitrate nitrogen, even when applied as late as April 15, had been carried below the main root zone, before the leaf system expanded and the period of rapid intake occurred. Analyses on these trees and growth response showed less nitrogen taken into the trees than where a similar application of nitrate was made to other trees after the foliage system had expanded.

While these rainfall conditions were somewhat unusual, the results indicate that if nitrate is put on very early in the spring and heavy rainfall occurs between that time and the bloom period, considerable nitrogen may be lost.

Thus, to secure maximum intake of nitrogen in the fall, it should be applied about a month or six weeks before leaf fall. In seasons of average rainfall, much of the nitrogen applied then should be taken into the tree before winter. For spring applications, the minimum loss of readily available forms of nitrogen will occur if application is delayed until near the period of full bloom. Delaying the spring application will also allow the grower to determine the fruit-bud set in his trees, and trees carrying a heavy bud set can be fertilized more heavily than those with few or no fruit buds.

If more slowly available forms of nitrogen are applied, such as cyanamid, the application must of necessity be earlier. Cyanamid must go through a number of changes before it becomes available for utilization by the trees. These changes require time. Also, if cyanamid is applied at the time or shortly before active growth is under way, it may prove directly injurious. Abundant available nitrogen is needed during the period of rapid growth lasting

from the start of growth until about six weeks after bloom, and if the more slowly available forms of nitrogen are used, they should be applied early enough to be available for tree use by bloom time.

In order to secure the greatest economy in the use of nitrogen, it should be applied to those areas of the root zone where there is relatively little competition from the cover crop of sod. In most of our mature orchards there is relatively limited growth of sod under the spread of the tree branches. On the other hand, there is a relatively dense development of apple roots throughout the whole area from the trunk out to the spread of the branches, the root population generally becoming less dense from the spread of the branches outward. Therefore, we would suggest that nitrogen be spread from the branch ends inward toward the trunk.

For trees 20 years old or more growing in sod, the minimum application should be one pound of actual nitrogen per tree, applied where there is a minimum of competition with the sod or cover crop. Even this application (six pounds of nitrate of soda or five pounds of sulphate of ammonia or cyanamid) probably is insufficient for maximum development of the tree, for some nitrogen will be lost. Unless this amount can be supplied, cultivation in the early spring to free nitrogen in the sod is advisable if the land is not too steep. Cultivation will reduce the nitrogen application required, but will not entirely replace the need for additional nitrogen in most orchards.

One point must be stressed in regard to feeding the tree. On most of our soils, the nitrogen that is taken into the tree largely determines the growth condition. We have indicated that this nitrogen intake must be large to maintain trees in good growth, and that nitrogen applications must be larger than the theoretical tree requirement if the quantity needed for the tree is to be supplied.

Complete fertilizers, if used in feeding the tree, must carry this amount of nitrogen if satisfactory growth conditions are to result. If complete fertilizers are used, the total nitrogen in the fertilizer applied per tree should still be as large as indicated, if maximum growth and productiveness of the tree are to be obtained.

Up to this time we have stressed entirely the feeding of the tree. Under many orchard conditions it is not possible to get a good growth of sod or cover crop in the orchard without also feeding the cover crop. The maintenance of a good cover crop of sod is necessary (1) to pre-

(Continued on page 18)

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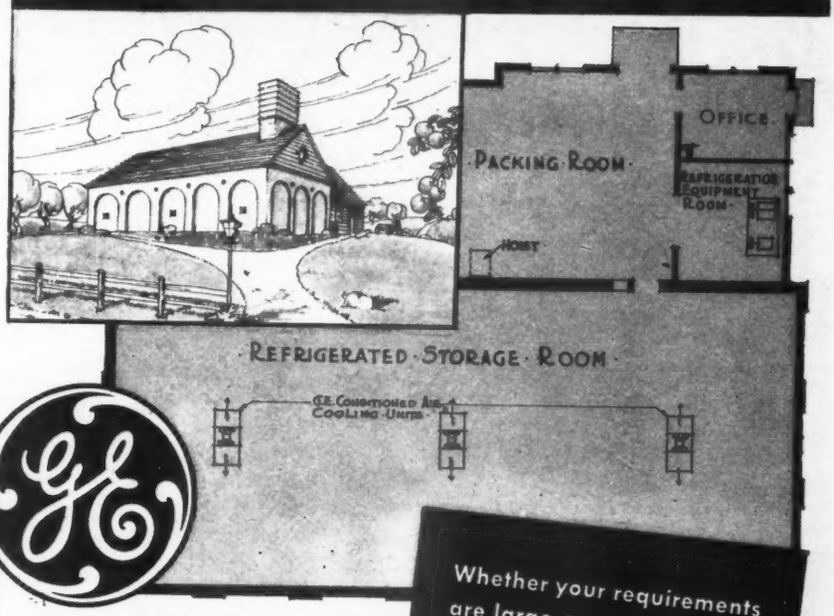

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YOU CAN hold for higher prices—*without danger of spoilage, shrinkage, off-flavors and discoloration*—with G-E Conditioned-Air Refrigeration Equipment in your storage room.

G-E Conditioned-Air refrigeration maintains a constant low temperature of 34°F. to 36°F. and a constant relative humidity of 80% to 85%—the ideal condition for safe, profitable preservation of fruits. It actually costs you nothing for it soon pays its own way in savings on spoilage and through premium prices you receive. Then it pays you a *clear profit* for years to come.

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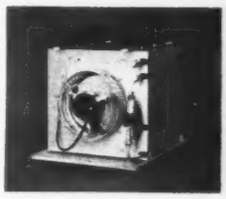

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Rugged, powerful, dependable, THRIFTY. Sizes from ¼ h. p. to 50 h. p.

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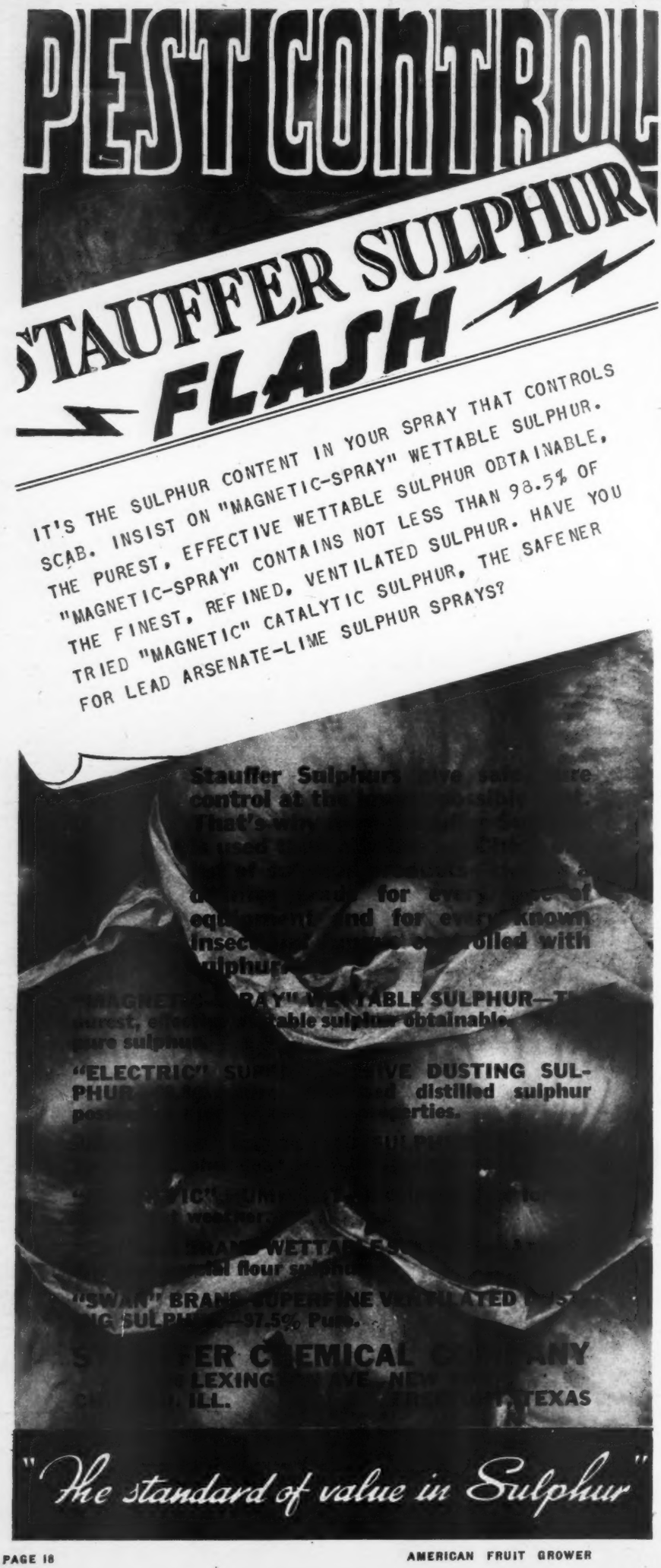
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STAUFFER SULPHUR
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IT'S THE SULPHUR CONTENT IN YOUR SPRAY THAT CONTROLS SCAB. INSIST ON "MAGNETIC-SPRAY" WETTABLE SULPHUR. THE PUREST, EFFECTIVE WETTABLE SULPHUR OBTAINABLE, "MAGNETIC-SPRAY" CONTAINS NOT LESS THAN 98.5% OF THE FINEST, REFINED, VENTILATED SULPHUR. HAVE YOU TRIED "MAGNETIC" CATALYTIC SULPHUR, THE SAFENER FOR LEAD ARSENATE-LIME SULPHUR SPRAYS?
"The standard of value in Sulphur"

PEARS •

(Continued from page 8)

of the fruit skin is often inhibited, resulting in cracking.

As with other similar diseases, the fungus causing infection overwinters in fallen diseased leaves. In the spring, spores are released from the infected leaves and are carried to new tree growth. Within less than a month a second set of spores is produced.

Adding to the difficulty of control of this pest is the spreading of this second set of spores to other fruits. The second set of spores on other fruits similarly affected can, in turn, become established on the pear stock. Thus, this fungus can be controlled on pears, but may become re-established on the same host by spores from infections on other fruit trees.

This disease is not related to pear fire-blight. The latter is caused by bacteria, while a fungus causes leaf-blight.

Regular pear spray schedules usually include measures for the control of pear leaf-blight. A weak Bordeaux mixture, such as 2-8-100 or one gallon of lime-sulphur to 50 gallons of water, will give effective control without injury. Pear fruit is especially subject to russeting and care is advised in the use of spray materials. When lime-sulphur is used, a spreader is added to increase adhesiveness. First application is made soon after leaf development, with subsequent applications every two or three weeks, depending upon rainfall.

FERTILIZATION

(Continued from page 17)

vent erosion and the loss of valuable surface soil which contains most of the nutrients, (2) to maintain the organic matter which is the greatest reservoir of plant food in the soil, and (3) to insure penetration of water. On many soils, such sods or cover crops cannot be maintained without fertilization. This is particularly true where the orchards are old and where, in the early days of the orchard, much cultivation may have been done and considerable erosion occurred.

Where grass sods are being grown and these are not as dense and thrifty as they should be, applications of complete fertilizer relatively high in nitrogen and phosphorus will unquestionably greatly improve the sod. Even 100 pounds per acre of such fertilizer broadcast over the soil area between the trees will greatly improve growth. With legume sods such as lespedezas, a fertilizer lower in nitrogen may be used, although even with these legumes the use of a fertilizer containing nitrogen in establishing them will usually prove helpful.

ORCHARD DRAINAGE

(Continued from page 10)

in the depth of the water table will be limited in range and that the length of time water is allowed to stand at dangerously high levels be held to a minimum. Apple trees with partially developed fruit are known to have been killed in a short time by a continued high water table which soon suffocated the roots.

In light-textured soils that do not offer great resistance to the movement of water through them adequate tile drains, placed at depths of about five or six feet will prevent the groundwater rising above optimum levels.

To secure similar results in heavier soils is a difficult problem and satisfactory drainage cannot always be obtained, even with closely spaced tile lines, because of the impervious nature of subsoils. Where such conditions exist it is not of much advantage to place the tile more than six inches below the impervious soil strata. Close spacing of drains and placing of gravel, cinders, or similar material will give better drainage and quicker relief, but these are expensive measures and are not always advisable unless a limited amount of such drainage will produce the desired benefit.

Even though complete drainage is not secured by drains in the heavy soil areas, they will very likely prove economical by making it possible to operate cultivating machinery, spray rigs, and other equipment from one end of the orchard to the other.

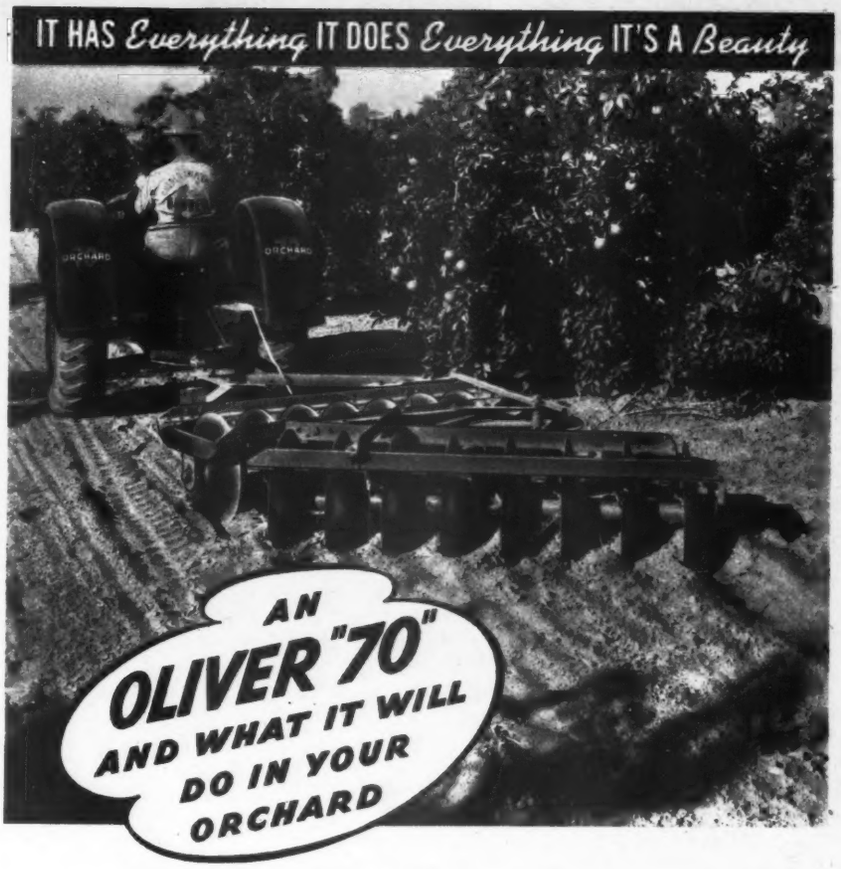
The spacing of tile lines is largely determined by the spacing and arrangement of the tree rows. Where the usual system of spacing rows 40 feet apart is followed, the lines should be located midway between rows to avoid, as much as possible, the danger of roots entering and blocking the drains. The probability of fruit tree roots blocking a tile drain depends largely upon whether or not there is a continuous or permanent flow of water. If the discharge of excess groundwater through the drain is intermittent, any roots that have entered at tile joints to obtain water usually will shrivel and die back with a subsequent stoppage of flow.

Fruit trees, with the exception of the pear tree, are not apt to cause serious root trouble in drains. Water-loving trees, such as willows, poplars and cottonwoods, should not be allowed to grow near tile drains, since they are definitely known to completely close drains within a very short time after installation.

Surface inlets provided at various locations will allow excess precipitation to reach a drain quicker and will tend to prevent concentration of the

(Continued on page 23)

IT HAS *Everything* IT DOES *Everything* IT'S A *Beauty*



Get an Oliver Orchard "70" and you get the neatest, nimblest tractor with the sweetest performing power plant that ever worked close to tree trunks without injuring them, or lugged a heavy sprayer down a row.

You get smooth, unfaltering power from six husky cylinders, in an engine designed especially for the fuel it uses, a self-starter that saves you from running around in front and breaking your back as you start and stop, stop and start in orchard work.

This Oliver Orchard "70" is low. The steering wheel is low—there's no exhaust pipe or water cap or any other projection above its streamlined hood—the new upholstered sponge-rubber cushioned seat is low and there's a new platform at drawbar height to stand on when driving.

This machine is built to dodge nimbly around and under trees without catching branches or injuring trunks. It has a variable speed governor—finger-tip control, new riding comfort—independent differential brakes that help the "70" turn in a small circle.

TWO ENGINE TYPES

The HC high compression engine gets the utmost out of regular gasoline—the KD gives top performance on kerosene or "tractor fuel." In either case, you get maximum power and economy from the fuel you use. Oliver gives you that choice because Oliver recognizes the demand of American fruit growers for economy and performance *no matter what fuel* is used.

By all means see and try an Oliver Orchard "70" as quickly as possible. You'll find it as good as it is beautiful. And meanwhile, send for our handsomely illustrated 20-page "70" Orchard and Grove Catalog, which tells you in picture and detailed description the story of this streamlined tractor.

See your Oliver Dealer or check and mail the coupon to Oliver, 400 W. Madison St., Chicago, Ill.

☐ Oliver Orchard "70" ☐ Oliver Standard "70" ☐ Tractor Mower
☐ Oliver Row Crop "70" ☐ Orchard Cultivator ☐ Orchard Disc Harrow

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MEETINGS . . .

Left—L. H. Spicer, Farmington, left, looks over a prize apple at the Michigan Horticultural Society meeting while J. A. Richards, Eau Claire, center, glances through a 1938 catalog with Herbert Nafziger, Benton Harbor.

Above—Snapped at the New York meeting in Rochester, left to right, are P. R. Morgan, Lewiston; Ben Stout, Olcutt; and Russell Sage, Sr. and Jr., of Burt. Mr. Sage, Sr., took active part in the grower-experience discussions.

Below—At the Ohio meeting C. W. Hauck, left, of Ohio State University, converses with W. W. Ellenwood, Jackson fruit grower and assistant secretary of the Ohio Department of Agriculture

Below—W. H. Matthews, Salem, left, shows Charles Adams, East Palestine, center, and Dean Clippinger, Van Wert, one of the promotional booklets of Ohio Apple Institute.

Circle—Busy giving those in attendance at the American Pomological Society convention the latest strawberry facts is Dr. George M. Darrow, U.S.D.A. small-fruits specialist.

Above—Frank H. Beach, secretary of the Ohio society, passes out question sheets used for the Question Box Sessions, feature of the Ohio program.

Right—One of the first to register for the Grand Rapids meeting of the Michigan Horticultural Society was O. C. Lawrence of Benton Harbor.

The Camera Doesn't Lie...

BASI-COP FACTS

Portion of a block of trees tested in the Michigan experiments where a 3-8-100 spray schedule of four applications proved BASI-COP IS BETTER. When photographed October 3, 1937, the infection had been completely checked and the trees were holding their foliage in a healthy condition.

Which Cherries WOULD YOU PICK?

The top ones! CORRECT! Their FULL SIZE for CANNING is the result of using Sherwin-Williams BASI-COP in a 3-8-100 mixture. The lower row of UNDERSIZED cherries is the result of copper injury to foliage following the use of 6-8-100 Bordeaux mixture. Both tests made during experiments conducted under the Sherwin-Williams Fellowship established at the Michigan State Agricultural Experiment Station.

CHERRY LEAF-SPOT: The Michigan experiments proved BASI-COP BETTER and SAFER than lime sulfur, Bordeaux mixture and all other copper compounds in the control of cherry leaf-spot. BASI-COP does not dwarf cherries or cause yellowing or dropping of leaves.

AS ARSENATE OF LEAD "SAFENER": Use ½ lb. BASI-COP, 1½ lbs. Hydrated Lime to 100 gallons water on apples beginning with the third cover spray (approximately three to four weeks after the bloom), as a safener for Arsenate of Lead. BASI-COP is compatible with summer oil emulsions. BASI-COP is safer to use on apples than Bordeaux mixture in these late applications.

Write for FREE Folder Telling Why BASI-COP IS BETTER

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FREE to FRUIT GROWERS

Interesting Bulletin tells how top growth can be increased 6 times . . .

Here's a bulletin every fruit grower should have — "How to Plant and Grow Trees." It reports conclusions digested from years of intensive research. Tells how experiments conducted with Peat Moss at State Experiment Station produced new shoot growth, averaging 82.7 inches in one year—6 times that of trees planted under normal soil conditions.

Before you plant any more trees, be sure to send for this bulletin. It's Free for the asking. Just address Dept. AFG-4.

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Division of Peat Import Corporation
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ACME GRAFTING COMPOUND

A new grafting compound endorsed by Michigan State College. Moderately priced and applied cold with a brush. Used also as a protective coating for injury. We can also supply Hand and Brush grafting wax and wax heaters. Send for price list. Dealers wanted. If interested send for free booklet "Bees & Fruit" by E. R. Root.

M. H. Hunt & Son, 510 N. Cedar St., Lansing, Mich.

The 450-foot-long crest of dam on the Beauman Orchard at Tunnel Hill, Ill., showing extra clearance of crest above water surface.

ORCHARD IRRIGATION IN HUMID STATES

(Continued from page 7)

lowing the first season of pumping it was apparent that a good deal larger amount of water could be profitably used, and the county commissioner was prevailed upon to supply the heavy duty county tractor and large earth-moving scraper.

With this equipment approximately five feet was added to the crest of the dam, and during the 1937 season pumping was started on May 25 and continued right up to the picking season, which was completed around June 20. A four-inch pump is used and an eight-inch main carries the water to lateral distributing lines. Irrigation is by means of flooding. The water is taken from the laterals and placed into contour ditches that run around the orchard hillsides. The water is led from one of these contours to the next contour below it, and by means of slight ditches it is directed around each tree.

It is figured that approximately 1000 gallons of water is pumped each minute and that approximately 30,000,000 gallons of water was added to the orchard during the 1937 season.

The gasoline engine used to operate the pumps consumes approximately three gallons of gasoline per hour, costing 12 cents per gallon. Running for the 25 days of the pumping season, the fuel cost runs slightly over $100. The cost of the pumping plant and using an industrial gasoline motor to pull the pump ran in the neighborhood of $1,000, and approximately $3,000 was required to set up the pipe distributing system.

Very careful test records were kept on the trees that were watered, and checking back on blocks of unirrigated trees showed an increase in volume for fruit for the irrigated trees of from 25 to 50 per cent. Slightly over 100 acres of trees were under irrigation. The increase in apple yield plus the price advantage of getting the fruit on the market at an earlier period, with a resulting higher price, has paid dividends that have probably paid out the entire cost of the installation during the two years that it has been in operation.

Construction of a pond for the storage of water is a job that any orchardist can safely undertake if he will carefully adhere to certain principles. It should always be remembered that the storage of water behind an earthen dam is a job that will meet with certain failure unless definite hydraulic principles are observed. The smallest seam or crack that is left in the base of the earth fill will permit a small trickle of water which little by little will carry away enough soil to cause final destruction of the entire fill.

The following salient points should be remembered in the construction of the dam:

1. Carefully remove all rubbish and sod from the entire area where the earth fill will be made.

2. Slope the sides of the gully walls so that no overhanging banks are present.

3. Width of the fill at the base should be four times the height of the water to be stored. Thus a 20-foot high dam will have a base width of 80 feet.

4. Bring the fill up uniformly, making one-foot layers over the entire area of the fill. Keep trash out of fill.

5. Have the crest of the dam at least three feet above the water line when full.

6. Provide a generous emergency spillway to carry excess water during times of flood.

In making the fill it is important that no trash or rubbish or dead grass be used. This material will rot in time, causing seepage lines. With many types of soil it is desirable to cut the core trench completely across the dam site and to fill this with a good clay or other impervious material and to tie it into the earth fill

(Continued on page 30)

ORCHARD DRAINAGE

(Continued from page 19)

surface run-off at low-lying points and saturation of the soil at these places.

The fruit grower can easily investigate the drainage conditions in his orchard by making soil borings to determine the depth of the underground water. A simple and inexpensive auger may be made by welding a one and one-half inch carpenter's solid-center spiral bit to a one-half inch iron pipe, fitted with T pipe connection and two short lengths of pipe for handles. The most convenient length of auger is from three to four feet. Extra sections of pipe can be used for extension purposes in making deep borings. The tip and sharp wings of the bit must be filed away and the points of the worm bent slightly downward to form a satisfactory cutting edge.

The character and texture of the soil and subsoil may be examined at various depths as the boring progresses. The depth from the surface of the ground to the water table at each observation should be measured accurately and recorded for further study or future use.

Comparisons of soil composition and drainage conditions in productive areas, with similar data secured in unsatisfactory orchard areas, will give a true picture of any drainage problem and may disclose valuable information that will be useful in planning soil treatments and locating needed drains. U.S.D.A. Farmers' Bulletin No. 1606, "Farm Drainage," gives complete information with illustrations on the construction of surface ditches and installation of tile drains. This bulletin may be obtained free from the Office of Information, U.S.D.A., Washington, D.C.

Of the 18 new grape varieties recommended by the New York Experiment Station for trial by fruit growers, five are green or yellow sorts, seven are red, and six are black or reddish black.

Ontario and Portland are early green grapes, with Seneca, a yellow grape, ripening about the same time. Brocton and Golden Muscat complete the list of yellow and green varieties, all of which have a large amount of European blood in them and hence are notable for their fine quality.

Dunkirk, Hanover, Hector, Keuka, Urbana, Watkins, and Yates are the red varieties, several of which are especially promising for table and wine use. Urbana is notable for its late keeping as it will hold up in common storage without shriveling, shelling, or decaying until March. Black and reddish black varieties include Concord Seedless, Erie, Fredonia, Sheridan, Wayne, and Westfield, with Fredonia rated as the best early black grape and Sheridan a late black.

FEED THEM RIGHT

MAXIMUM yields of high quality fruit and a good growth of cover crops depend upon an adequate supply and proper balance of plant-food elements. The use of nitrogen alone depletes the soil reserves of phosphorus and potash. Reduced yields, poor keeping and shipping quality, poor wood growth, die-back, and top and root injury result . . . The ratio of potash to nitrogen is especially important. Potash improves the quality of the fruit, gives tone and vigor to the trees and increases their resistance to diseases, thus increasing yields. Successful growers are finding the use of 400-600 lbs. of such popular fruit fertilizers as 9-6-6, 7-8-6, 10-6-4, and 7-12-10 necessary and profitable.

Consult your county agent or experiment station about the fertility of your orchard soils. See your fertilizer dealer. You will be surprised how little it costs to get more potash in your fertilizer.

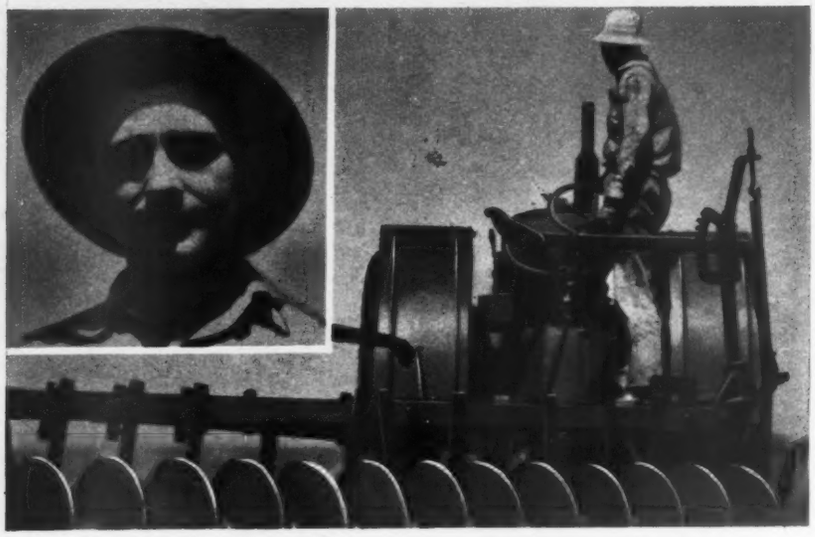
Write us for further information on feeding fruit.

American Potash Institute, Inc.

INVESTMENT BUILDING WASHINGTON, D. C.

More Potash means More Profit

"USES 10 GALLONS LESS GASOLINE A DAY TRAVELS ¼ MILE AN HOUR FASTER"



GETS 2½ MILES MORE every 10-hour day out of his high compression tractor. Because of side-by-side tests in the same field, Florian Polcyn, Gorham, Kansas, found out just how much better a high compression tractor is.

IN THE SAME KANSAS WHEATFIELD, PULLING THE SAME LOAD, FLORIAN POLCYN'S HIGH COMPRESSION TRACTOR BEATS TWO LOW COMPRESSION TRACTORS

BECAUSE the Polcyn Brothers of Gorham, Kansas, use three tractors to work 1300 acres, they have had a unique opportunity to test the merits of high compression and low compression tractors in the same field. Says Florian (Mike) Polcyn:

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"This saving in gasoline and gain in additional distance holds good whether we are plowing with a nine-foot one-way plow, or plowing with a five-bottom moldboard plow."

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SEND FOR FREE 24-PAGE BOOKLET

Write today for FREE illustrated 24-page booklet "How To Get More Tractor Power." It tells you: How To Reduce Tractor Costs. Why Some Fuels Produce More Power. How High Compression Works. How To Do More Work In The Same Time. Send a penny postcard now to Dept. T-6, Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturers of anti-knock fluids for premium and regular-grade gasolines.

It pays to buy **GOOD GASOLINE**
FOR CARS, TRUCKS AND TRACTORS

SOIL EROSION

(Continued from page 11)

of the surface which makes penetration difficult and causes surface run-off. On level land sheet erosion results, while on rolling land the effects of surface run-off may be much more evident.

When we speak of sheet erosion we are referring to an enemy that, while constantly at work even on relatively level cultivated land, often is not recognized until its results have become sufficiently evident to give us a violent "jolt." Some years ago when we saw the soil between tree rows gradually get lower each year, when tree roots were occasionally exposed and the trees appeared to be sitting on a prominent mound, we closed our eyes to what was happening. We tried to "kid ourselves" into believing that we were throwing the soil toward the trees by cultivation. After a long while we discovered that sheet erosion was actually stealing the surface layer of soil—the best soil of the orchard.

We must remember that the above conditions apply chiefly to the heavier soil types. Sandy soils are less erosive as water penetrates them more readily and there is much less tendency for water to move over the surface. As they are more open and permit greater and more rapid downward movement of water, sandy soils are more subject to leaching of soluble materials than are the heavier types.

Sandy soils, also, are more subject to wind erosion than the loams and clays. Blow-sand is difficult to hold in place unless actually covered with some protecting mulch, or by the suitable use of windbreaks, crop strips or the like.

To prevent the losses occasioned by erosion, as well as to provide for a more efficient long-period program of high production, more apple orchards should be grown under sod or mulch systems of soil management. Experiments in different sections of the country on many types of soil show that apple trees may be grown successfully and profitably under these systems.

On most types of soil the use of deep rooted legume sods should be confined to the young orchard previous to bearing age. On heavy, impervious subsoils alfalfa or sweet clover serves to open up the soil. As the roots decay openings for air and moisture movement are provided. This also leaves the soil in a more favorable condition for tree root growth. On deep, moist soils deep rooted covers may be used in older orchards, but where moisture shortage is a possibility they are likely to deplete the soil moisture to a considerable depth in competition with the trees.

Bluegrass or other grass crops are

generally more suited to bearing orchards. If considerable erosion has taken place, it may be necessary to fertilize the whole area to secure a stand of grass. It must also be remembered that trees grown in sod must be adequately fertilized with nitrogen. Large amounts of nitrogen are tied up in the grass, temporarily at least, by conversion from an available to an unavailable form. As the sod is cut the cuttings decay and the organic matter of the soil is built up. Some orchardists break the sod every two or three years and cultivate it several times to make some of the stored food elements available and then permit the sod to re-establish itself.

On severely eroded areas, where it would be difficult to establish a grass cover, or in locations where considerable washing has taken place, mulching should be practiced to prevent further loss of soil. If a light mulch is used seeding sometimes may be accomplished in connection with it, using grasses that are known to be capable of establishing themselves in the locality under consideration. Top dressing with manure often is an effective aid in establishing a cover.

In the case of a devitalized and unproductive apple orchard, mulching is one of the most rapid and efficient methods of restoring vigor and production. Straw is good, but manure or strawy manure is even more effective. Cover the area beneath the tree, beginning a foot from the trunk and extending well beyond the spread of the branches. Use enough material to smother out all vegetative growth and replenish the covering as necessary. Some growers start with two or three bales of straw to a medium sized bearing tree and add another bale each year or every other year. Other growers apply three bales every three years.

In the grain growing regions where straw can be secured reasonably this system of culture is not expensive as compared with cultivating and seeding cover crops. In some sections where straw is not available, fruit growers are growing such crops as Sudan grass or marsh hay on other land for use as a mulch in the orchard. Mulch not only prevents soil washing but conserves moisture both by preventing run-off of rainfall and by reducing evaporation from the soil in dry periods.

Mulching also is effective both as a cultural practice and as a means of erosion control with grapes, strawberries, brambles and other bush fruits. While scattered instances are reported of successful stone fruit culture under mulch, these fruits are generally considered to require cultivation for maximum productiveness. It is being found, however, that these fruits may be grown with much less

(Continued on page 26)

IT'S EQUALLY IMPORTANT TO *Protect* YOUR DELIVERIES

Certainty **in crop production and** ***surety*** **in tire performance go hand in hand. Both** ***require*** **Plus-Protection. In Fisk Tires you get this plus-protection where you need it most:** ***in the Blow-Out Zone!***

Fisk Tires, with Anti-Friction cord fabric in ***every*** **ply, are more flexible, cooler-running, easier riding than ordinary tires. They have a surer traction-grip. All of these plus features combine to give you more per dollar, even over the toughest roads.**

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The *Extra Punch* Poison

COMBAT destructive infestation with "Corona Dry" Arsenate of Lead. This fast action poison is correctly and finely ground so that every pound has the top-most poison power – the extra jolt that kills quicker. It spreads evenly, covering a greater area than ordinary lead sprays.

A renowned orchard authority said recently that there is no substitute for arsenate of lead. For more than 30 years, successful orchardists have been saying that there is no substitute for "Corona Dry".

Systematic spraying with this *extra punch* poison will assure finer skin texture, better color, healthier fruit. Will bring *you* far more profits from your crop.

SEND FOR FREE SPRAY CHART

Complete details for the proper spraying of fruit, vegetables, flowers, etc. will be found in the Corona Spray Chart. To receive free copy, simply send your name and address to the Corona Chemical Division of the Pittsburgh Plate Glass Company, Milwaukee, Wisconsin.

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CORONA MERKO . . . . . for treating seed corn
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SOIL MANAGEMENT

(Continued from page 13)

and clovers turned under. Every two or three years the Lespedeza is plowed or disked under around late February or early March. Reseeding naturally follows, which is sometimes supplemented with extra sowing of seed at the rate of 15 to 20 pounds per acre.

Another practice followed by a few growers on very steep land is shown in Figure V, where the tree rows are clean cultivated and the middles between the tree rows are sown to rye in the fall with Lespedeza sown in the rye during the month of March. The rye is left to mature and is then cut for grain. This practice keeps the land between tree rows covered with vegetation during winter and summer. A variation of this practice is to strip cultivate the land when alternated middles in every other year are clean cultivated, keeping all growth disked under until late summer (Figure VI).

Since these fruit growers have seen the value of cover crops in maintaining tree vigor and preventing soil erosion, they are beginning to use acid phosphate, broadcasting it over the whole orchard area, as a means to increase the growth of the cover crops. Readily available nitrogen fertilizers are used by all growers as a direct stimulus to twig and fruit development. Most of the growers apply the nitrogen in the spring about a month before the buds swell, while a few make the applications in the fall just previous to the shedding of the leaves.

SOIL EROSION

(Continued from page 25)

frequent cultivation than formerly was considered necessary. This in itself is a step in the direction of erosion control.

When a large amount of straw is added to the soil, there is a temporary disruption of the carbon-nitrogen relation, resulting in a reduction of the available nitrogen. After three or four years the balance is not only restored but the decaying straw generally supplies abundant available nitrogen. During the first few years, therefore, a nitrogen carrier should be used as a fertilizer in connection with the straw mulch.

While it is true that any cultural or soil management practice directly affects only the surface soil to any marked degree, we know that many indirect effects are produced in lower soil depths. Once the surface soil is destroyed, moisture and fertility problems arise even with deep rooted orchard trees. The surface is worth saving. Let's save it.

Your Guide to

More Efficient Spraying

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Coverage is the key to successful pest control. A sure way to test your spray coverage is with AMERICAN FRUIT GROWER Spray Targets. Placed in the tree, these targets allow inspection after spraying to show how chemicals are invading the "hard to reach" parts of trees. They reveal graphically whether or not your spraying is efficient.

As real money-makers, the targets will allow you to make necessary shifts in spraying operations resulting in less spray waste and more high-quality, profit-making fruit. They have been tried and proven under actual orchard conditions.

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Enclosed find $1.00 for 3-year subscription to AMERICAN FRUIT GROWER (New ☐) (Renewal ☐) and three Spray Targets.

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Books for Fruitmen

THEORY AND PRACTICE IN THE USE OF FERTILIZERS, by *Firman E. Bear*, Second Edition, John Wiley and Sons, New York.

A second edition of this useful book will be welcomed by farmers, horticulturists, and all students of crop production. Such a work brings to the reader a text or reference book covering a wide range of subjects related to fertilizer practices.

The history of the original findings regarding the nutrition of plants is well prepared and keeps alive the fascinating pioneer work of the early scientists.

The orchardist will find certain chapters of particular interest. The one dealing with nitrogen fertilizers has an immediate application, particularly the discussion of this element as relating to drought conditions. The author states, for instance, that drought resistance has been noted with nitrogen-treated fruit trees when grown in sod, an observation which has not been sufficiently emphasized in the literature. The various nitrogen carriers and correct time of application as determined by experiments is fully discussed, as well as the soil reaction at which farm crops are at their best.

Of special interest at the present time is a full treatment of soil organic matter and the role it plays in agriculture. The attention being focused on this question by government and state agencies in their efforts to control erosion and provide for land conservation makes this a timely statement from the pen of an authority on soils questions. The over-emphasis which has often been given to the possibility of building up large reserves of organic matter is here recognized. "The value of manure as a source of organic matter has been grossly exaggerated," he states. He points out that the organic matter content of the soil could not be materially increased by adding 12 tons of manure every three years, as is often attempted, but that additional sources would be necessary in the form of crop residues. The use of artificial fertilizers in producing heavy crops of green manures is quite properly emphasized. By so doing the biological, physical, and chemical properties of the soil are improved.

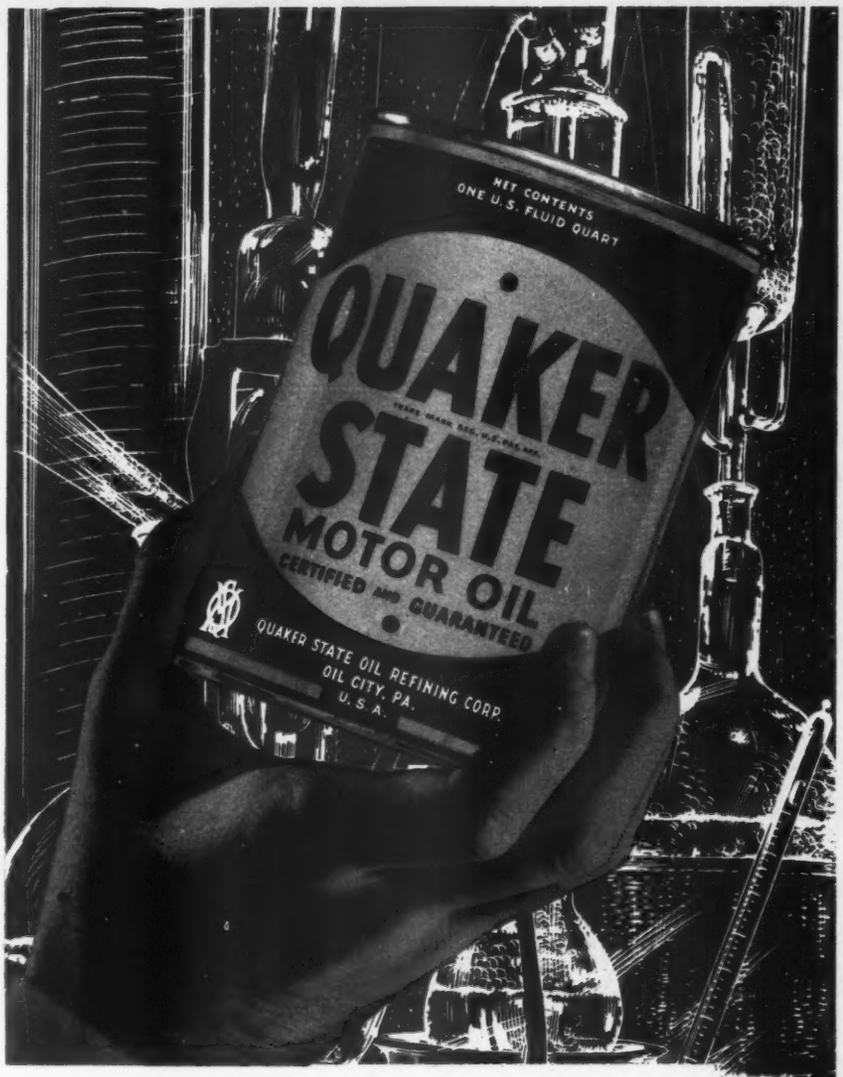
A new chapter is added in this edition which deals with another important and timely subject. This is on trace or minor elements in soils and crops. Much is being written on the use of boron, zinc, copper, iron, magnesium, and other elements in agricultural production. Areas have been found where additions of these elements have become imperative. Without them disease or deficiency symptoms occur which limit production or render the product worthless. The fruit growers in certain areas cannot longer ignore this situation and this work brings to them an up-to-date treatise.

It is a well prepared and well written volume from the pen of one who has probably seen at first hand more different situations than any writer who has contributed on this subject.

CYCLOPEDIA OF HARDY FRUITS, by *U. P. Hedrick*. Revised 1938, The Macmillan Co., New York.

This new revision of a standard horticultural guide book contains a supplement dealing with new varieties which have been developed since the first edition was published. Written for fruit growers, nurserymen, professional horticulturists, fruit buyers, and students, this volume thoroughly describes varieties of hardy fruits grown in North America and is an accurate guide for identification, name classification, and the best regions for producing the different varieties. Structural descriptions for the various fruit classes are also presented.

The book is well illustrated with color and black and white plates and line drawings of individual specimens.



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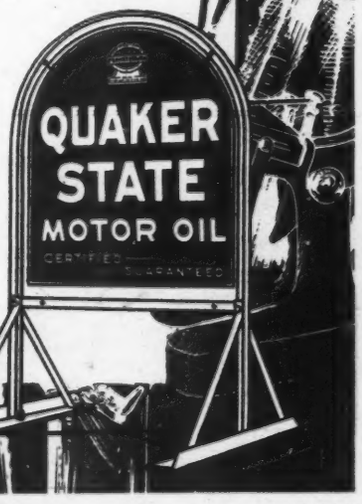

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RED AND BLACK RASPBERRIES—VARIETIES AND CULTURE

By A. S. COLBY
University of Illinois

This is the concluding section of Dr. Colby's outstanding article on raspberry varieties and culture, the first part of which appeared in the January issue.—EDITOR.

IN 1919, the Latham was introduced by the Minnesota Experiment Station and soon took its place as the leading variety in the Midwest. The Latham is highly productive, a prolific plant maker, and is not only hardy in the North, but succeeds in latitudes as far south as southern Illinois. Especial cultural attention is necessary, however, in those latitudes if insects and diseases, often limiting factors, are to be controlled. Its attempted culture on an extensive scale still farther south in Arkansas was found to be unprofitable.

The fruit of the Latham, while attractive and firm, is only fair in quality. The variety is not well liked in some northern sections, as in New York, because the plant is susceptible to mildew, and the berries have a tendency to crumble. However, the Latham furnishes a good example of the value of fruit breeding work. In one year alone—1926—according to W. H. Alderman, "the income or wealth accruing to Minnesota from the Latham was more than adequate to cover the total cost of the State-supported fruit breeding experiments since the establishment of the first farm in 1878."

In 1924, two more red varieties were made available to the trade, the Viking, from the Vineland, Ontario, station, and the Van Fleet, from the U.S.D.A. station at Glenn Dale, Md. Viking is a vigorous grower and is productive. The berries are of excellent flavor.

The Van Fleet was brought out in an attempt to extend the southern limit of raspberry growing in this country. The plant is vigorous and productive. The fruit is of medium size, yellowish-red in color. The variety is not claimed to be winter hardy in the North; in fact, we often find winter-killing on unprotected canes at the Illinois Experiment Station.

In 1930, the Minnesota station introduced the Chief. The variety is highly resistant to cold, productive, and fibrous. The berries are early, an attractive bright red, and of high quality. Chief has become a standard early variety.

There are some differences of opinion as to whether both Chief and Latham should be fruited in the same locality. Some growers want both, in order to extend the season; others, for example, in southern Illinois, prefer to grow only the Latham. They have been able to move Latham at a good price because of the earliness of their season. The late pickings of Chief extend into the season of Latham, and the difference in berry size of the two varieties when shipped together is undesirable.

Within recent years, the New York station has introduced three main crop red raspberries—Newburgh, Taylor, and Marcy—and one fall-bearing variety—Indian Summer.

We note that nearly a score of black raspberry varieties, chance seedlings, attracted some attention during the years following the introduction of the Doolittle.

The Cumberland, a midseason variety, introduced in 1896 after being grown for some years at Camp Hill, Pa., by David Miller, has probably been the best known and most widely grown black raspberry. Its chief assets were plant hardiness and productiveness, with berries of large size and high quality. During the last few years, however, this variety has lost popularity because of its susceptibility to anthracnose. It still has possibilities since it may be somewhat resistant to red raspberry mosaic, and anthracnose can be controlled by spraying.

Of the late varieties, the Gregg, found as a chance seedling on the Gregg farm in Ohio County, Indiana, in 1866, was for many years the standard in the Midwest. It is now seldom seen, since the plant was not sufficiently winter hardy as far north as it seemed desirable, it was susceptible to many raspberry diseases, and not adapted to all soil types. However, Gregg fruits are large, handsome, and of high quality, and the plants are productive where they grow well. At the Illinois Experiment Station we have several good seedlings of Gregg on second test.

The Quillen is another late variety, one somewhat more resistant to anthracnose than other standard sorts.

As a result of its breeding program, the New York station has recently introduced three black raspberries of considerable promise, Dundee, Naples, and Bristol. The plants are hardy, vigorous, and productive. At the Illinois station we find them all resistant to anthracnose and leaf spot.

It is extremely important that nothing but vigorous, healthy, and

true-to-name raspberry plants be set. It is dangerous to use plants from a patch that has not been inspected and passed by competent authorities.

The prospective raspberry grower who buys nursery stock for planting is now, I believe, much more likely to get clean, true-to-name plants than was the case a few years ago. In most cases, a fine spirit of co-operation exists between the nurserymen, the state nursery inspection service, and the members of the departmental staff of the college in the state concerned.

The selection of a favorable site with sufficient air and water drainage and a soil at least moderately fertile, are prerequisites in the establishment of a profitable raspberry plantation. All too often, however, our soils are lacking in organic matter, so necessary to increase the ability of the soil to absorb and retain water and, during its process of decay, to help to set free plant nutrients. To a certain extent, we can approximate optimum natural soil conditions through the use of animal and green manures followed by cover crops.

The question most commonly raised by the raspberry grower has to do with the need for fertilizer. If the soil is well supplied with humus and in good physical condition, commercial fertilizer may not be profitable. Again, commercial fertilizer is of little use if the stand of plants is poor or if certain diseases and insects are common and not controlled. A number of station experiments have shown that the diameter of the fruiting canes is correlated with yield. On this account, practices which bring about this result are desirable.

Recommendations for the use of different fertilizers vary with different soils and latitudes. In some cases the use of a quickly available nitrogen fertilizer up to 300 pounds per acre early in the spring may be helpful. Apply it between the rows, rather than on the plant crowns. Experimental results indicate that, in general, raspberries do not respond to phosphorus, potash, or lime as generally as to nitrogen. These substances may, however, be added on an insurance basis and especially to advantage when cover crops are being grown.

The fertilizer question is, in its last analysis, one for each individual grower to solve for himself by trying out the various materials to determine their value under his conditions. It is beside the point to admit that the individual hates to do this, hoping that some magic fertilizer formula will cure all his ills. It is not easy to get him to see the value of the practice, as we know, but highly necessary that he should test different fertilizers on different rows with enough buffer rows between to keep the treatments

(Continued on page 34)

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GRASSELLI Arsenate of Lead and NuREXFORM Arsenate of Lead are now colored pink to identify them as poisons.

ORCHARD IRRIGATION

(Continued from page 22)

proper. This core trench serves as a key holding the dam to the dam site and also preventing seepage underneath the earth fill.

A common failing of inexperienced operators in constructing dams is to start the fill by building a roadway through the center of the dam and spilling the earth either side of the center line. In doing this settling cracks later appear, and also there is a tendency of the larger particles of material to roll to the bottom forming a line of coarse material immediately next to the dam site and thus forming an excellent seepage line.

TABLE I—Number of Rainless Periods In Humid States Each Year Between April and October

State	*Duration 1-2 Weeks*	*2-3 Weeks*
Iowa	8	1
Michigan	7	1
Minnesota	6	2
Wisconsin	6	1
Illinois	6	1
Indiana	6	1
Ohio	5	1

Tractors of the type so commonly employed in orchard cultural practices furnish ideal power to be used in constructing ponds. Oftentimes with rollover scrapers it is practical to scrape out considerable of the dam material from the storage space above the dam site, thereby increasing the storage capacity of the dam. A 30 horsepower tractor pulling a one cubic yard scraper will move approximately 30 cubic yards of earth per hour. Thousands of earth filled dams of 2000 cubic yards fill show that with this size of tractor a similar dam can be constructed in less than a week of operation time. A team pulling a five cubic foot slip scraper will move approximately 10 cubic yards of earth per 10-hour day, so it is apparent that tractor power is by far the most economical power to be used in constructing any sizable fill.

Farm power contractors are located in most orchard areas and as these operators are usually equipped with heavy duty tractors and have the full complement of equipment necessary for the construction of dams and terraces, it is often practical to hire them to construct the dam. The usual rate charged by these operators is $2.50 per hour for the tractor and operator, when working on a one cubic yard scraper. Assuming 300 cubic yards of earth moved per day, the cost per yard of earth moved is less than 10 cents. A quick study of the cubic

yards of earth necessary to fill the gully will give a good idea of the cost of the completed dam, if a cubic yard cost of 10 cents is figured.

On the Thomas S. Smith orchard near Roodhouse, Ill., an earth filled dam having approximately a 45-foot fill was constructed last fall. A. L. McClay of Hillview, Ill., furnished the tractor equipment as part of a farm power contracting service that he engages in. His tractor equipment included a "Caterpillar" 30 horsepower Diesel tractor pulling a one and one-half yard rollover scraper. Approximately 300 cubic yards of earth were moved in a 10-hour day.

This 11,000 cubic yard earth-filled dam was constructed with a base width of approximately 175 feet, and it is estimated that approximately 20,000,000 gallons of water will be stored in the lake above the dam. Approximately 40 days of operating time were necessary for the construction of the dam, and about 100 acres of orchard will be irrigated.

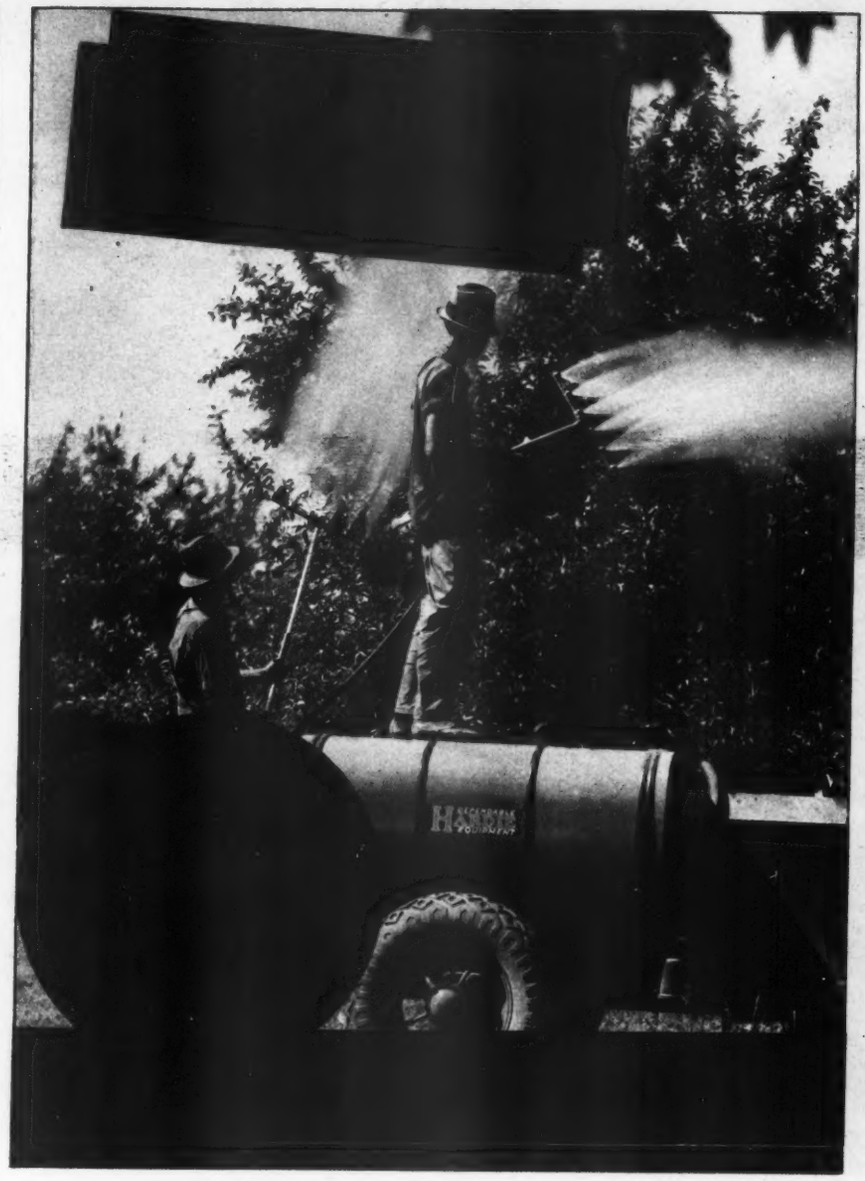
Ample provision must be made in constructing the farm pond for taking care of excess water during periods of floods, and emergency spillways often prove a practical means to this end. These spillways may be covered with masonry or concrete, and in some cases concrete tubes are constructed around or underneath the dam. It is usually wise to consult your county agent or the extension service of your state university for their recommendations as to good procedure in your territory.

Methods of applying the water to the orchard are numerous and the particular means chosen will be dependent upon whether the system will nec-

(Continued on page 33)

TABLE II—Progress In Irrigation In Humid States

	Acres Irrigated	
State	*1931*	*1936*
Connecticut		355
Delaware		10
Illinois	250	630
Indiana	1,756	550
Iowa	1,000	1,000
Maine		98
Maryland	5,700	1,150
Massachusetts		2,000
Michigan	2,000	7,600
Minnesota	150	895
New Jersey		6,000
New York		1,825
Ohio	500	10,000
Pennsylvania		300
Rhode Island		200
Vermont		7
Wisconsin	40	340
Virginia	?	3,600
	11,396	36,560



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Calcium Arsenate	GRASSELLI Spreader-Sticker	Nicotine Sulfate
DUTOX, a fluorine insecticide	Fluxit Spreader	Dormant and Summer Oils
SULFORON, a wettable sulfur		Copper Compound-A

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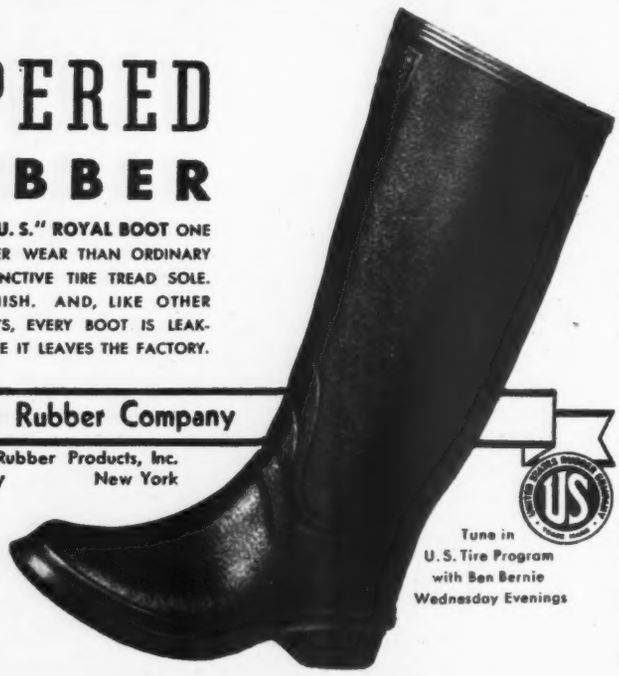

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NUT CULTURE IN ILLINOIS

THE cultivation of hardy nut trees in Illinois has received considerable attention from the experiment station and private growers. During the recent Farm and Home Week at the University of Illinois, nut growing was featured as one of the topics for general discussion. Dr. A. S. Colby, in charge of nut cultural work at that institution, and vice-president of the Northern Nut Growers' Association, discussed the possibilities in nut growing in Illinois. The variety situation was emphasized, as the success of a nut planting is based upon the choice of suitable varieties. Varieties of hardy nut trees vary as much in the characteristics that make a good variety as do varieties of apples, peaches, strawberries, etc. Dr. Colby's talk was illustrated with slides and demonstrational material. Illinois nut growers participating in the discussion included Robert Endicott of Villa Ridge and Royal Oakes of Bluffs.

Illinois will be remembered as the source of an unusually fine lot of northern pecans which were discovered in the 1934 contest of the Northern Nut Growers' Association. Dr. Colby and others were instrumental in bringing these to light and in starting their propagation. J. G. Duis of Shattuc and Joseph Gerardi of O'Fallon are also interested in the discovery and propagation of new and worth while new hardy nuts for Illinois.

The E. A. Riehl Farm, Godfrey, Ill., established by the late E. A. Riehl, who began private experimental work in nut culture more than 60 years ago, has long been known for its nut plantings, especially its chestnut orchards. This farm, now in the able hands of Miss Amelia Riehl, is still a leader in the culture of hardy northern nuts. One of their specialties is the propagation of the new varieties discovered in recent prize nut contests and otherwise. Readers will be surprised to learn that in their nursery are 116 varieties of nuts, including 44 black walnuts, 49 hickories, pecans and their hybrids, as well as a number of butternuts and chestnuts.

At the Washington meeting of the association Dr. L. H. MacDaniels of Cornell University was assigned the task of preparing a form on which amateur nut propagators might keep a record of their experiments in order that all data gathered would be systematic and comparable. These forms are now ready and may be purchased from the secretary for a nominal sum.—GEORGE L. SLATE, *Sec'y*, Northern Nut Growers' Assn., Geneva, N.Y.

Last season, probably more than ever before, the need for more fruit farm cold storages was emphasized. With this in mind, the AMERICAN FRUIT GROWER Reader Service Bureau with the opening of the new year offered a consultation service to assist individual growers with their storage problems. Brief announcements in the past three issues have resulted in hundreds of growers asking for advice from members of our staff who have visited and studied fruit farm cold storages in all parts of the country. Perhaps you, too, have questions about your particular storage situation. If so, send them to Reader Service Bureau, AMERICAN FRUIT GROWER, 1370 Ontario St., Cleveland, Ohio.

ORCHARD IRRIGATION

(Continued from page 31)

essarily be permanent or portable. Common methods in use at the present time may be roughly classed as follows:

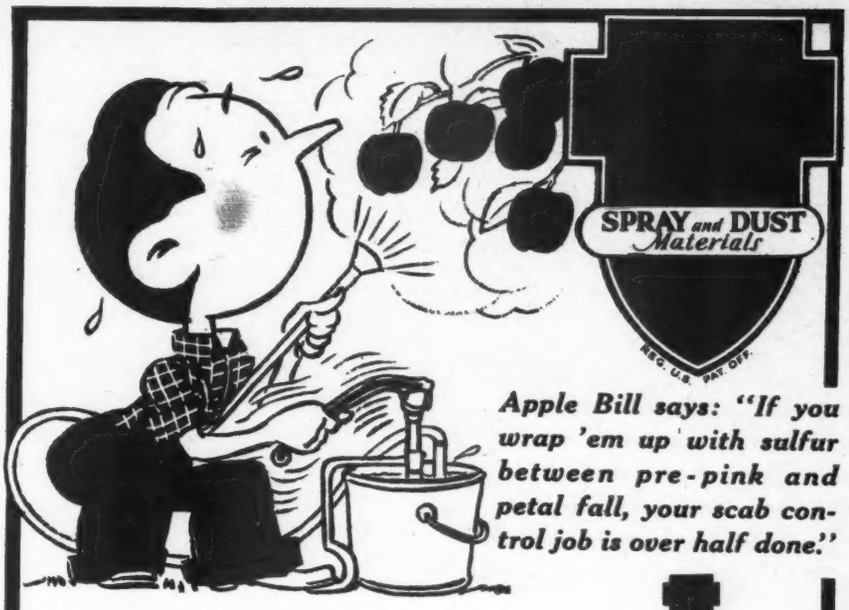
1. Pipe Systems
   a. Revolving spray sprinklers
   b. Eyelet and porous hose
   c. Overhead or surface perforated pipes
2. Surface Irrigation Systems
   a. Furrow
   b. Flood
3. Subsurface Irrigation Systems
   a. Pipe
   b. Ditch

The system chosen will vary greatly with the particular topographic lay of the orchard and the money that is available to spend on the system. Practically any of the systems may be adapted to all orchards, except that the flooding type or furrow row systems require either level ground or the construction of contour terraces.

Due to the short pumping season usually necessary through the humid states, it is desirable to keep the pumping plant investment overhead at the very lowest figure possible as otherwise the overhead charge will be excessive compared with the amount of water pumped. Many orchardists are finding that their tractors form desirable power units to hold a pump, as the tractors are usually not seriously needed on other work during the pumping season. Tractors equipped with belt pulley drives or rear power take-offs are particularly suitable for this type of operation, and orchardists fortunate enough to be using Diesel tractors in their operation are able to keep their power costs for pumping extremely low.

In conclusion, it is safe to say that the money spent on supplemental irrigation systems pays big dividends in increased fruit production and improvement in cultural conditions of the trees. Freedom from worries during short drought periods is possible, and while not 100 per cent of the orchard acreage can be successfully irrigated, it is safe to say the majority of the orchards in the humid states are so situated that splendid results can be obtained.

Orchard irrigation will help every fruit grower in obtaining size, color and plant vitality. If you have an irrigation problem, write Reader Service Bureau, AMERICAN FRUIT GROWER, 1370 Ontario St., Cleveland, Ohio.



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RASPBERRIES

(Continued from page 29)

sufficiently separated, leaving check rows for the necessary comparisons.

It might be appropriate to refer in this connection to Mark Twain's famous statement that, while "everybody talks about the weather, nobody does anything about it." The progressive raspberry grower does do something about it. He air conditions his home with the profits from his raspberry plantation, which he has set on a good site with some natural or artificial shade, and protection from the hot breezes of summer and the cold winds of winter, mulched the plants in the rows, and used some form of irrigation.

We have increased the yield of raspberries over 50 per cent at the Illinois station by mulching the rows with strawy manure. We have also improved the size and quality of blackberries by shading the plants during the ripening season. Several Illinois growers are irrigating their raspberries to advantage.

While soil erosion is literally "as old as the hills," it is only recently that much attention has been given it by the raspberry grower. We have seen raspberry plantations with the rows running up and down the slope where the plant crown stood out several inches above the ground. Keeping the soil well filled with humus, planting on the contours, staggering the plants when the hill system of setting is practiced, and mulching the rows, are a few of the cultural modifications of great value in preventing erosion.

Pruning and training practices with the raspberry are based upon a knowledge of the growth and fruiting habits of the plant and may vary with the same variety in different localities. The species have biennial tops and perennial roots, the canes growing one season, fruiting the next, and then dying. The main reason for pruning is to increase the profit from the patch, in other words, to improve the quality and size of the fruits.

Pruning, proper, may be classified under three heads: spring tipping or topping of blackcaps, the cutting out of old canes after fruiting, and the removal of superfluous young canes and heading back canes and laterals as necessary during the dormant season. The plants are trained to regulate vine vigor, keeping the bushes within bounds and off the ground, when necessary, by a support. Unless these practices are based upon experimentation in the different regions, mistakes are frequent, leading to partial crop losses. Most of the state experiment stations, as well as the U.S.D.A. have studied these problems under their own conditions, and have published their recommendations.

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CHICAGO

Well-known experts in the fruit world who are directly connected with the officering of the Massachusetts Fruit Growers Association, from left to right, are John E. Rice, Marlboro, president; George A. Drew, Westford, former president; Arthur Howard, Pittsfield; R. A. Van Meter, Amherst; D. Walker Cheney, Brimfield; Hamilton Lincoln, North Brookfield, all vice-presidents; and W. R. Cole, Amherst, secretary-treasurer.

STATE NEWS

(Continued from page 14)

MAINE—When 75 degrees is recorded on his Fahrenheit thermometer the fruit grower can concern himself about the plum curculio. It is at this temperature that the adult beetles become most active and best control waits upon such orchard temperature, Dr. W. D. Whitcomb of Massachusetts Experiment Station told growers on the occasion of the Maine Pomological Society annual meet.

Lime-sulphur in pre-blossom and petal-fall applications and wettable sulphur of extreme fineness in summer (cover) applications were recommended by Dr. E. F. Guba, also of the Massachusetts station.

Certain relationships between several fungicides and leaf growth were presented by Dr. W. D. Mills of Cornell University. In this respect wettable sulphurs after petal-fall application have been particularly good, and hope was expressed that they might prove effective in the earlier sprays as well, which would be still better.

Dr. George F. Potter, our good neighbor of New Hampshire, in his talk on thinning, stated that he found quite a tendency even in McIntosh to alternate heavy and light crops. Completing the thinning operation before July 4 gave best effect, he stated, on current crop and induced fruit-bud formation for the following crop. Similar effects have not been obtained with Baldwin. With McIntosh, the crop thinned was reduced and the following crop larger, so that the two-year yield of thinned trees exceeded that of trees not thinned.—J. H. WARING, Orono.

TENNESSEE—A. L. Rawlings, a nurseryman of Joelton, near Nashville, has solved the problem of furnishing growers with the variety of peach trees they want. The growers bring him their own labeled budsticks from the variety of trees they wish propagated, and the owner's name, as well as that of the variety, is used in marking the lots. Mr. Rawlings says that in the past two seasons he has propagated 30,000 peach trees for growers in Davidson and nearby counties.

Hearing of R. R. McUmber's planting of yellows-free Blakemore strawberries near Greenfield aroused the interest of growers in the Portland section. But "seeing is believing," so H. L. W. Hill and other growers of the section made the 350-mile trip to visit this planting. Hill writes: "I have never found a better field in my life. They are absolutely free from yellows or any other kind of disease. We are advising our growers to abandon the selling or planting of any of their plants."

May 4, 5 and 6 are the dates set for the Fifth Annual Strawberry Festival at Humboldt. Growers of the shipping area around Humboldt are fighting to regain their top rank position of five years ago when more than 1700 carloads of berries were shipped. Interest is keen in selecting the champion grower of the season. Liberal cash premiums in many classes fill the huge gymnasium with tiers of crates of beautiful berries. The exhibit has been appropriately termed "delusciously"! Some 15,000 visitors attended the festival last year and the popularity of the affair, which has brought increasing crowds each succeeding year, gives promise of seeing a record-breaking crowd again this year.—A. N. PRATT, State Horticulturist, Nashville.

INDIANA—Assistance of the Governor is being invoked in an effort to secure enforcement of the Grading and Branding law. Inclusion on containers of produce of the name and address of the grower, grade of the commodity, and net contents of the container are the requirements of the law.

Indicative of the horticultural interest throughout the State was the completion by 61 students of an intensive eight weeks course in horticulture at Purdue. This represented the largest number of students ever enrolled for the course at the university.

During the last five years there has been an alarming increase in codling moth population in the southern part of the State. Growers fear that a sufficiently heavy lead application to hold the moths in check is too heavy to be removed below the tolerance by present fruit washers.—R. L. WINKLEPLECK, Sec'y, Lafayette.

NEW YORK—The State is tremendously apple blossom conscious this spring. The Apple Blossom Festival which was started in western New York a few years ago has now spread so that western New York counties each have an elimination festival the week prior to the main festival, which this year will be held at Leroy. Each county holds suitable exercises to select a queen as representative at the western New York feature event. Each county sends a float and sends the candidates for queen as princesses and ladies-in-waiting to their candidate for State honors.

The Hudson River Valley has recently launched a festival to be held at Kingston the first week in May. An effort is being made to tie this eastern festival with the New York World's Fair and to make it northeastern and regional in nature. It is hoped the governors of the northeastern states will be present and that representatives from New York City will also be on hand.—H. B. TUKEY, Geneva.

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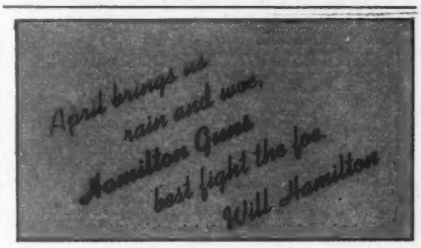

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ANNUAL SPRING CHECK-UP

TRUCK

SPRAYER

TRACTOR

Lee Mantle of the Mantle and Mantle Orchards, Painesville, Ohio, is shown in the above illustrations preparing his fruit farm equipment for the busy operating season ahead. Radiators are cleaned out and motor oil is changed as part of the check-up operation. Fruit farm equipment can be efficient only if it is kept in good working condition.

NEW

- PEAT MOSS FOR PLANTING
- ROOT-GROWTH ACID

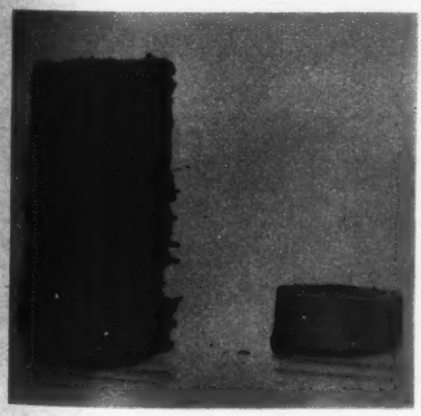
By HANDY ANDY

While new products for fruit farms along the lines of equipment and marketing have been most prominent, there are also some introductions to help with more efficient growth and propagation of our fruit plants that should receive attention. This trend toward emphasis on subjects other than production has probably been started by the fact that for several years we have been concentrating on production problems. But it is still true that when recent discoveries reveal features that will aid in better fruit growing they should be considered. So if you have any new ideas on production problems write me in care of AMERICAN FRUIT GROWER, 1370 Ontario St., Cleveland, Ohio.

PEAT MOSS FOR PLANTING •

Getting young trees off to a good start is the least that a fruit grower can do to insure subsequent growth after establishment of the orchard. Some of the things that we've learned to avoid when setting trees are air pockets about the roots, soil packed so hard there will be no aeration, and insufficient moisture to supply the amount needed for rapid growth of the young trees.

Some months ago an article appeared in AMERICAN FRUIT GROWER describing the planting of trees at the New York Experiment Station with



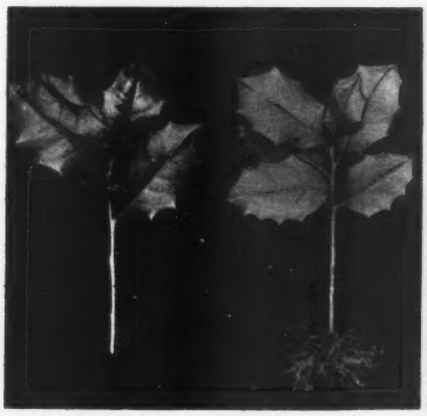
peat moss. In adjacent rows trees were planted in the regular manner. At the end of a season's growth the difference in development of the trees was marked. New York scientists attributed the added growth of the peat-moss-planted trees to the ability of the moss to absorb moisture.

A bucketful or about 12 quarts of the dampened peat moss is sprinkled into the planting hole along with the soil as the tree is set. Peat moss is available in bales for large-scale use and in paper bags.

The accompanying illustration shows the water-absorbing capacity of peat moss. At the right in the illustration is a compressed tablet of granulated peat moss. Next to it is the expanded tablet after being placed in a small amount of water in a shallow container for a short time. When the moisture is squeezed out, the moss will again absorb an equal amount of water. It is reported that peat moss is good for nursery row soil when trees are held.

ROOT-GROWTH ACID •

Another victory can be chalked up for the chemical laboratory. This time it's an acid known to the research worker as indolebutyric and commonly termed auxilin. This acid has the power of inducing root growth on cuttings when it is applied to their basal ends.



Before application to cuttings, the auxilin is diluted with water according to manufacturer's directions. After the desired treatment, cuttings are planted and roots develop in from one-half to one-third the usual time.

Cuttings may be made from any part of the plant, and in the case of fruits, hardwood or dormant cuttings give the best results. In the above illustration, the cutting on the right received the auxilin treatment while that on the left was not treated.

Scraps of old spray hose come in mighty handy, so one of my fruit grower friends tells me. He uses them on bucket handles to keep the wire from cutting hands and gloves, as grips on spray guns and brooms, and as water hose for washing trucks and autos.

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SUCCESSFUL ORCHARDS

● A "ROUND TABLE" PAGE FOR EVERY GROWER ●

This page is a place for growers to get together and exchange experiences and ideas. The beginner, as well as the veteran, will find here many practical suggestions for better and more profitable fruit growing. In return for the helps you receive from this page, be ready to pass on, for the benefit of others, any new idea, method or procedure you have developed or run across. Just jot it down as it occurs to you (a postcard will often do) and mail it to the "ROUND TABLE EDITOR," AMERICAN FRUIT GROWER. Don't worry about fancy writing. What the readers of this page want are practical pointers—that are to the point.

WASHINGTON GROWER BUILDS REGULATOR

REGULATION of the flow of fruit through washers and graders has long been a problem. Most fruit growers put experienced handlers on the job of supplying fruit to washers and graders so that the flow will be uniform, but a Washington grower, Bruce L. McKinstry, has solved the problem mechanically. He says:

"I built a regulator seven or eight years ago, but it was not reliable and we abandoned its use. Again several years later I built another using a better motor, but due to a simple fault which at the time I did not discover, it, too, was unsatisfactory.

"From then until last fall the machine stood in a corner of our shop, unused. While repairing some other machinery, I decided once more to try to make the regulator run satisfactorily. I discovered the fault which had prevented its successful operation, and as a result we used the regulator throughout the packing season.

"Only a person who has had close association with the handling of fruit over a sorting table and mechanical grader can appreciate the importance of running the fruit at a uniform speed and at the speed of greatest efficiency. Any variation from this speed means a loss in either quantity or quality of work, and either means loss in money.

"The machine which I built and which we used last fall eliminated our problem of irregular feeding of fruit. The machine is simple in design, consisting of a variable-speed electric motor, reducing gears, and an electric contactor. I have built only the one machine, and it is somewhat crude in its construction. I paid $25 for the General Electric phonograph motor used in it, but I understand satisfactory motors of this type can be bought for much less money now.

"In order to be satisfactory in the hands of users, such a machine would have to be of good mechanical construction, easily lubricated, and of such electrical construction as to meet with state codes. My model is none of these things, but I have no doubt I could redesign the machine to fit these requirements."

RED SPORTS FEATURE EXPANSION PROGRAM

INCORPORATED in the program of the Wine & Garber Orchards in Delaware, are plans to use the newer red sports for increased plantings. R. W. Wine reports: "We are planning to expand our 150 acres of apples and grapes, using principally red sports of York, Stayman, Delicious, and Rome. Besides these we hope to use Starr and Williams Early Red. Our apple orchard now is planted at various distances from 30 to 40 feet and the entire orchard is under cultivation.

"As much care as possible is taken in the control of pests and we have found it practical to use bands for worm control on our trees. Banding is supplementary to our regular spraying work which is done by means of two sprayers using 300 to 500 pounds pressure.

"We are continually trying to improve our fruit farmstead. In 1935 we suffered the loss of our home by fire and immediately constructed a new house."

The type of band used by Mr. Wine is shown in the illustration on this page. Banding is becoming increasingly popular as a practice to be followed where regular sprays do not completely control the worm situation.

Codling moth band on 25-year-old Jonathan apple tree. Bands should not be used on young trees or those having smooth bark due to possible injury.

USES SAME SCHEDULE FOR REPEATED SPRAYING

SEVEN years is a long time, especially when you think of this span as the useful life of a spray formula. No other set of agricultural recommendations is changed so frequently as the spray chart. Each year new directions emanate from colleges and experiment stations, and the changes are often so marked that progressive fruit growers must become students in order to formulate spraying plans for each new season. J. W. Cannon of the Pike County (Mo.) Producers Association, however, has used one spray formula for seven consecutive years. Here's what Cannon has to say about his operation.

"I personally own and operate 130 acres of bearing apples and 110 acres of non-bearing stock. Our principal varieties are Golden Delicious, Jonathan, Red Winesap, Starking, Red Delicious, Red Rome, Grimes, Willow Twig, Stayman Winesap and Black Twig. Besides spraying this acreage, I also take care of pest control operations on five separate orchards totaling 80 acres.

"For the delayed dormant spray I use a three per cent oil emulsion. One and one-half gallons of liquid lime-sulphur to 50 gallons of water make up the pre-pink spray, while the pink application consists of the same amount of liquid lime-sulphur with the addition of one and one-half pounds of lead arsenate for each 50 gallons of spray. Our calyx spray consists of one and one-half pounds of lead arsenate, three pounds of Kolofog and three pounds of hydrated lime to each 50 gallons of water.

"The first cover spray, applied eight days after the calyx application, contains the same materials as the calyx spray. Eight days from the start of the first cover, the second is applied using the same strength of lead arsenate, but cutting the amounts of lime and Kolofog in half. For the third cover, the last that we apply, the same materials are used as for the second cover, and it is also applied after an eight-day interval.

"Last season we finished the last cover on June 19. I have used this same formula and schedule on Pike County Producers' orchards during the past seven years. We have had complete control of worms and fungus every year. There has been no burning and the fruit has been clean with a good finish. Last year from my 130 acres of bearing orchard I harvested 58,500 bushels or 113 cars.

"In extremely wet years I substitute liquid lime-sulphur for Kolofog in the calyx and first cover sprays. For all these operations I use three 200-gallon sprayers having 300 pounds pressure, one 300-gallon rig with 350 pounds pressure, and one 400-gallon outfit delivering 400 pounds pressure."

Careful and consistent spraying by Mr. Cannon has resulted in the production of clean fruit and his experiences should prove of interest to our "Round Table" readers.

Meet a Customer of Yours

PERHAPS it doesn't seem like much to you when this woman drops in at her grocer's and says:

"I'll have half a dozen oranges —25 pounds of flour—a peck of potatoes—a pound of butter—a dozen eggs—and how's your lettuce today?"

But stop and consider how all these things find their way to the corner grocer.

Instead of one woman, think of twenty-five million women who do the buying for their families—your customers.

Instead of a dozen oranges—think of 1,790,000 *tons* of oranges and grapefruit.

Think of 8,600,000 *tons* of wheat flour—3,500,000 *tons* of potatoes—440,000 *tons* of butter—330,000 *tons* of eggs—and you begin to see the amount of food moved by the railroads every year.

The crops you raise are worth real money only when they can be delivered to the ultimate customers — wherever those customers happen to live in the United States.

And if it were not for the railroads stretching from your farm or shipping point to every corner of the land—and their ability to carry tremendous amounts of farm products—you could raise only crops that nearby communities could use.

So the American railroads and the American farmer depend on each other. The railroads need the tonnage which the shipment of crops represents—and the farmer needs the railroads to give him a national market.

ASSOCIATION OF
AMERICAN RAILROADS
WASHINGTON, D. C.

Study THESE TWO PICTURES!

THEY GIVE THE ANSWER TO SUCCESSFUL CROPS

Dow "MIKE" Sulfur* does *two* vital jobs and thousands of growers depend on it year after year to produce larger, finer crops.

First, it provides outstanding protection against apple scab and other fungous diseases.

Second, it produces bigger, better crops by promoting the normal development of foliage.

Every apple requires from forty to fifty leaves to bring it to peak maturity. Abundant healthy foliage is the first essential of a successful crop.

Careful tests show that trees sprayed with Dow "MIKE" Sulfur develop full, healthy foliage—and larger crops of fine color, grade "A" fruit.

SWITCH TO DOW "MIKE" SULFUR

Abandon caustic sprays that endanger foliage and rob the apple of its food. Dow "MIKE" Sulfur is non-caustic in addition to being highly effective against fungous diseases. Its microscopic fineness assures the uniform coverage and lasting adhesion necessary for effective disease control.

There Is a Dow Insecticide for Every Purpose

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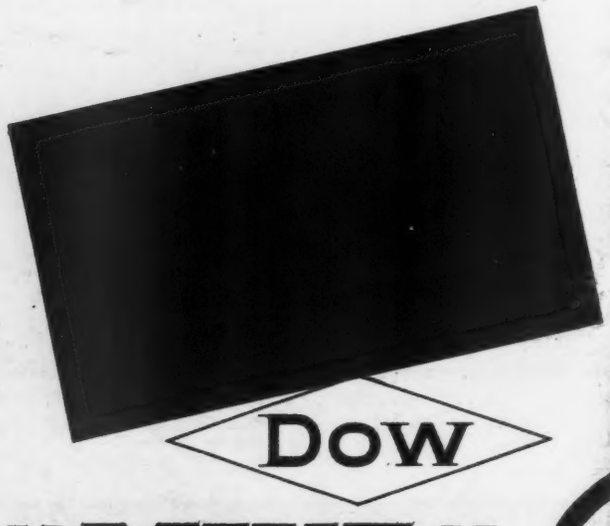

"MIKE" Sulfur

*Trade Marks Reg. U. S. Pat. Office